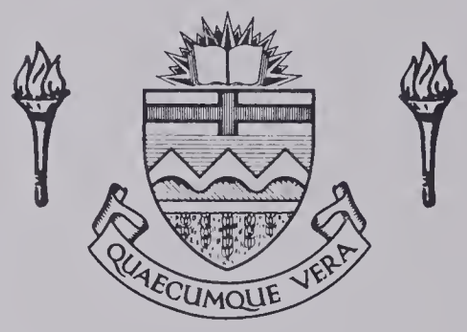
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Houghton Mifflin Mathematics 2

Teacher's Resource Book

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Houghton Mifflin Mathematics 2

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Metric Commission, Canada, has granted use of the national symbol for metric conversion.

T2

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Introduction

Development

Houghton Mifflin Mathematics is developed in six strands: **Numeration**, **Arithmetic**, **Geometry**, **Measurement**, **Graphing**, and **Problem Solving**. The first five strands are treated in a *block* approach. This allows for continuity and easier reinforcement and retention of mathematical skills. Problem Solving is an integral part of the entire program and is treated within all five of the other strands. (See *Problem Solving*.)

A typical unit of *Houghton Mifflin Mathematics* contains ten lessons, each on a single, back-to-back, tear-out sheet in the student's workbook. It must be emphasized that the workbook pages only provide part of a lesson: some teacher-guided developmental exercises and pencil-and-paper practice. A complete lesson must also include the introductory and teaching ideas in the TRB (*Teacher's Resource Book*) along with the follow-up activities. The use of materials in lesson activities is considered an integral part of the development of the objectives. Care is taken to provide a smooth transition from manipulative/oral activities to illustrations and exercises on workbook pages.

Each lesson treats only one objective. The objectives are numbered by a computer code to allow easy tracking of skills for reinforcement and remediation. (See *Learning Objectives*, Page T6.) This approach provides learning in "bite-sized bits" to ensure students master each objective before proceeding to the next level of difficulty.

Organization

The mathematical development in *Houghton Mifflin Mathematics 2* follows this sequence:

1. Numerals to 20 (1 unit)
2. Addition and subtraction to 9 (1 unit)
3. Numerals to 99 (1 unit)
4. Addition and subtraction to 12 (1 unit)
5. Geometry (1 unit)
6. Numerals to 999 (1 unit)
7. Addition and subtraction without regrouping (1 unit)
8. Measurement: length, temperature, and time (1 unit)
9. Addition and subtraction to 18 (1 unit)
10. Addition and subtraction with regrouping (1 unit)
11. Fractions and decimals (½ unit)
12. Measurement: time, mass, and capacity (½ unit)
13. Multiplication (½ unit)
14. Readiness for division (½ unit)

The sequence was written with the intention that it be done in order. For example, measurement lessons often assume that the number development in the preceding chapters has been done. However, some flexibility is possible for teachers who wish to alter the sequence. Geometry can be done at any time and some of the numeration can precede the arithmetic units if desirable.

However, teachers should note that the lesson plans were written with the previous sequence in mind. Arithmetic lessons contain both readiness for counting with larger numbers plus activities for review and reinforcement of numeration concepts that are assumed to have been covered. If the sequence is altered, care must be taken to ensure that the TRB suggestions are still appropriate for the students' present level of development.

Review and Testing

The authors of *Houghton Mifflin Mathematics* recognize the importance of review and testing resources so that the teacher can keep track of the skill development of each student and provide extra help when it is required. It must be emphasized that testing in primary mathematics involves more than pencil-and-paper tasks. Such exercises are useful but, when used alone, will not necessarily determine whether a student has really understood and mastered each objective.

The primary program contains the following features:

1. An optional **Pretest** in the TRB. This may be helpful to keep track of the students' development. However, it should be used with discretion. On one hand, it may be frustrating for

the students if they have no background in the skills being tested. In this case, use the Pretest as a follow-up practice sheet or as a review sheet later in the year. On the other hand, success on the Pretest does not mean that students have completely mastered the objectives of the unit. They may be able to do pencil-and-paper practice by rote without fully understanding the concepts. This is particularly true for units that introduce addition and subtraction operations.

2. The suggestions in the **Teacher's Resource Book** both in the unit introductions and in the lesson plans often give numerous ideas for assessing the students' understanding of the objectives. As well ideas are given for classroom activities which will help reinforce concepts covered in earlier units.

3. Extra Practice is available for *every lesson* in Houghton Mifflin's Testing and Practice Masters. The half-page black-line masters are reproduced with answers in the TRB.

4. The **Test** in the workbook provides groups of questions on the objectives of the unit. The TRB describes the objectives being tested. The same caution applies as noted in the section *Pretest*.

5. A **Post-test** is reproduced in the TRB and has the advantage that the students have had no prior access to it. The Pretests and Post-tests are included in the Testing and Practice Masters in addition to being given in the TRB in reduced size with answers.

6. Finally, the pages at the end of the **Workbook** provide still more practice including one full page of Extra Practice for each unit.

Activity Centres

The introduction to each unit includes a suggestion for setting up an Activity Centre. Reference to the centre and additional suggestions for activities is made in the individual lesson plans of the units. The materials for these activities are standard ones usually available in primary classrooms or, alternatively, they are items that children can make or disposable items they can bring from home. They are summarized in the materials list also provided in the unit introduction. Teachers should pick and choose from the activities according to the students' ability and also according to the materials that are available. Often, substitute materials may occur to the teacher where the exact ones suggested are not on hand.

The TRB also provides extra black-line masters which can be torn out and reproduced to make into many of the materials mentioned in the Activity Centres. These accompany the unit introductions of the given unit. Such masters include grids, dot paper, blank clock faces, picture-set cards, numeral cards, and many more.

Problem Solving

Problem Solving is an area of study receiving increased emphasis in the elementary mathematics curriculum. It is not enough for students simply to master basic mathematical skills. In today's world, they must be able to apply those skills to solve practical, real-world problems.

The first step in this process involves interpretation of simple, routine problem situations, given first in pictures, then in words. Beyond that, a complete mathematics program must give the students an armoury of strategies with which to attack all types of problems, routine and non-routine. Such strategies include drawing diagrams, guesswork, using a model, estimation, looking for patterns, making lists, simplifying or rewording the problem, and many more. See the Scope & Sequence on page T17 for a complete list of problem solving objectives for this grade level.

In the early years almost all numeration and arithmetic lessons involve mathematical interpretation of a picture or else drawing a picture to interpret a mathematical statement. This is a primary problem solving objective. In that sense, problem solving is an integral part of the entire program. However, *Houghton Mifflin Mathematics* goes farther in providing extra lessons on specific problem solving objectives. The program deals with problem solving in several different ways:

1. Lesson Plans

Every possible lesson puts the mathematical objective in a real or concrete setting so that students experience mathematics as a useful subject. They are also prepared for types of problems that will occur in the problem solving lessons.

2. Problem Solving Lessons

Most units have at least one full lesson on a specific problem solving objective. In the primary years, the students progress from pictorial interpretations to solving simple, routine word problems.

3. Reinforcement and Enrichment

These sections on the right-hand page of the TRB in each lesson often provide problem solving experiences other than the routine types included in the workbook.

4. Extra Practice

The Testing and Practice Masters also have extra problem solving practice accompanying each PS objective.

5. Problem Solving Activities

Every grade level has a separate booklet of problem solving activities, correlated to the lessons in the textbook. These booklets provide ample opportunity for students to extend their problem solving abilities even further.

Learning Objectives

The following objectives are covered in depth in *Houghton Mifflin Mathematics 2.*

Numeration

		Lesson	Pages
N1	Recognize and write the numerals 0 to 9.	1-1	1-2
N2	Order numbers 0 to 9.	1-2	3-4
N3	Count on from 10 and write numerals to 20.	1-3	5-6
N4	Count and order numbers to 20.	1-4	7-8
N5	Group tens and ones and write numerals 10 to 20.	1-5	9-10
N6	Determine one more or one less than a given number.	1-6	11-12
N7	Identify which number is less or greater.	1-7	13-14
N8	Count by tens to 90.	3-1	45-46
N9	Count by ones to 35.	3-2	47-48
N10	Recognize and write numerals to 99.	3-3	49-50
N11	Relate counting to adding and subtracting one.	3-4	51-52
N12	Order numbers to 100.	3-5	53-54
N13	Count by tens to 100.	3-6	55-56
N14	Group objects in tens.	3-7	57-58
N15	Compare numbers to 100.	3-8	59-60
N16	Identify ordinals, dates of the month, and days of the week.	3-9	61-62
N17	Round to the nearest ten.	3-10	63-64
N18	Count by hundreds to 900.	6-1	109-110
N19	Identify and write numerals to 999.	6-2	111-112
N20	Compare numerals to 999.	6-3	113-114

N21	Count to 999.	6-4	115-116
N22	Count by 10s to 999.	6-5	117-118
N23	Count by 5s to 999.	6-6	119-120
N24	Identify the fractions $\frac{1}{2}$ and $\frac{1}{4}$.	11-1	213-214
N25	Identify and print $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$	11-2	215-216
N26	Identify and print tenths from $\frac{1}{10}$ to $\frac{9}{10}$	11-3	217-218
N27	Identify and print tenths from 0.1 to 0.9.	11-4	219-220
N28	Count by 2s; recognize odd and even numbers.	12-1	233-234
N29	Count by 3s and 4s.	12-4	239-240

Arithmetic

		Lesson	Pages
A1	Add to sums of 4 and 5.	2-1	21-22
A2	Add to sums of 6 and 7.	2-2	23-24
A3	Add to sums of 8.	2-3	25-26
A4	Add to sums of 9.	2-4	27-28
A5	Subtract from 4 and 5.	2-6	31-32
A6	Subtract from 6 and 7.	2-7	33-34
A7	Subtract from 8.	2-8	35-36
A8	Subtract from 9.	2-9	37-38
A9	Add or subtract related sentences.	2-11	41-42
A10	Add, with sums to ten.	4-1	67-68
A11	Add, with sums to eleven.	4-2	69-70
A12	Add, with sums to twelve.	4-3	71-72
A13	Add, using three addends, to sums of twelve.	4-4	73-74
A14	Subtract, with minuends to ten.	4-5	75-76
A15	Subtract, with minuends to eleven.	4-6	77-78
A16	Subtract, with minuends to twelve.	4-7	79-80
A17	Add and subtract related sentences.	4-8	81-82
A18	Identify related sentences for fact families.	4-9	83-84
A19	Add and subtract with sums to twelve.	4-11	87
A20	Use place-value skills in adding ones to tens and ones.	7-1	129-130
A21	Add tens and ones with no regrouping.	7-2	131-132
A22	Add two-digit numbers with no regrouping; add with money.	7-3	133-134
A23	Subtract ones from tens and ones, no regrouping.	7-4	135-136
A24	Subtract tens and ones, no regrouping.	7-5	137-138
A25	Subtract to find differences, using tens and ones, no regrouping.	7-6	139-140
A26	Add three-digit numbers, no regrouping.	7-8	143-144
A27	Subtract three-digit numbers, no regrouping.	7-9	145-146
A28	Add and subtract with sums to 12.	9-1	169-170
A29	Add, with sums to 13.	9-2	171-172
A30	Subtract, with minuends to 13.	9-3	173-174
A31	Add, with sums to 14.	9-4	175-176
A32	Subtract, with minuends to 14.	9-5	177-178
A33	Add, with sums to 15.	9-6	179-180
A34	Subtract, with minuends to 15.	9-7	181-182
A35	Add, with sums to 18.	9-8	183-184
A36	Subtract, with minuends to 18.	9-9	185-186
A37	Add doubles with speed and accuracy; add doubles plus one.	9-10	187-188
A38	Add and subtract two-digit numbers, without regrouping.	10-1	193-194
A39	Rename tens and ones by finding another ten.	10-2	195-196
A40	Add a one- and two-digit number, with regrouping.	10-3	197-198
A41	Add 2 two-digit numbers, with regrouping.	10-4	199-200
A42	Add 2 two-digit numbers, with and without regrouping.	10-5	201-202
A43	Subtract from numbers to 18; regroup for subtraction.	10-6	203-204
A44	Subtract a one-digit number from a two-digit number, with regrouping.	10-7	205-206
A45	Subtract 2 two-digit numbers, with regrouping.	10-8	207-208
A46	Subtract 2 two-digit numbers, with and without regrouping.	10-9	209-210
A47	Add or subtract 2 two-digit numbers, with and without regrouping.	10-10	211
A48	Multiply by 2 with products to 20.	12-2	235-236
A49	Multiply by 5 with products to 20.	12-3	237-238

A50	Multiply by 3 with products to 18.	12-5	241-242
A51	Multiply by 4 with products to 20.	12-6	243-244
A52	Multiply by 1; review multiplication facts with products to 20.	12-7	245-246
A53	Prepare for division.	12-8	247-248
A54	Divide using the division symbol.	12-9	249-250
A55	Divide with dividends to 20.	12-10	251

Measurement

		Lesson	Pages
M1	Write amounts of money to 20¢ and exchange dimes and pennies.	1-8	15-16
M2	Exchange ten dimes for one dollar.	3-11	65
M3	Determine the value of sets of nickels and sets of quarters.	6-7	121-122
M4	Recognize and write amounts to $9.99 involving dollars, dimes, and pennies.	6-9	125-126
M5	Use non-standard units to measure length.	8-1	149-150
M6	Measure length with a centimetre ruler.	8-2	151-152
M7	Estimate length in centimetres.	8-3	153-154
M8	Estimate and measure length in metres and centimetres.	8-4	155-156
M9	Estimate and measure temperatures to the nearest degree Celsius.	8-5	157-158
M10	Tell time to the hour.	8-6	159-160
M11	Tell time to the half-hour.	8-7	161-162
M12	Tell time to the five-minute interval.	8-8	163-164
M13	Order the months of the year, the days of the week, and the hours of the day.	8-9	165-166
M14	Find the minutes after and minutes to the hour.	11-5	221-222
M15	Count and make change to 25¢.	11-6	223-224
M16	Experience mass and non-standard units using a pan balance.	11-7	225-226
M17	Estimate and measure mass in kilograms.	11-8	227-228
M18	Experiment with capacity using litre and half-litre containers.	11-9	229-230
M19	Identify the use of common measurement tools.	11-10	231-232

Geometry

		Lesson	Pages
G1	Identify and investigate rectangles and triangles.	5-1	89-90
G2	Identify circles and squares and investigate repeating patterns involving 2D figures.	5-2	91-92
G3	Identify balls and boxes and investigate patterns involving 2D and 3D figures.	5-3	93-94
G4	Identify and investigate cans, cones, and cubes.	5-4	95-96
G5	Investigate the faces of common solids.	5-5	97-98
G6	Investigate the number of edges and corners of common solids.	5-6	99-100
G7	Explore tiling and area using congruent figures.	5-7	101-102
G8	Recognize similar shapes and sort figures by colour and by number of sides.	5-8	103-104
G9	Identify symmetric figures and lines of symmetry.	5-9	105-106
G10	Draw symmetric figures.	5-10	107

Graphing

		Lesson	Pages
GR1	Read and construct bar graphs.	1-9	17-18
GR2	Relate picture graphs and bar graphs.	1-10	19
GR3	Read pictographs.	7-10	147

Problem Solving

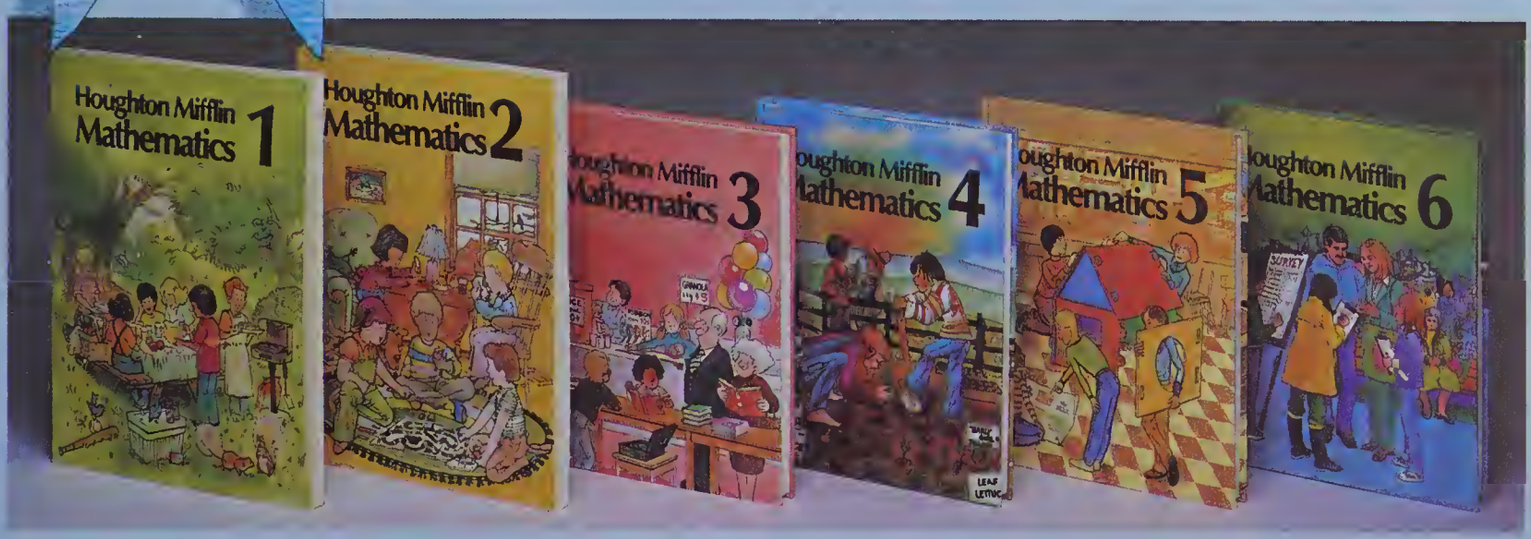
		Lesson	Pages
PS1	Interpret and solve addition picture and word problems.	2-5	29-30
PS2	Interpret and solve subtraction picture and word problems.	2-10	39-40
PS3	Add or subtract to solve picture problems.	2-12	43
PS4	Solve addition and subtraction word problems.	4-10	85-86
PS5	Solve simple word problems involving money to 99¢.	6-8	123-124
PS6	Locate amounts on a table and compare amounts to $9.99.	6-10	127
PS7	Add or subtract two-digit numbers in money problems, no regrouping.	7-7	141-142
PS8	Interpret and construct tables and bar graphs.	8-10	167
PS9	Add and subtract mixed questions; solve simple word problems to sums of 18.	9-11	189-190
PS10	Solve comparison, subtraction word problems.	9-12	191

Mathematics for the 80's

Are these your priorities?

Problem Solving
Real-World Applications
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Ready-to-Use Teacher's Resource Books
Individualized Learning Materials
Testing and Management Programs
Year-Round Motivational Features

...Then here is your program!



Houghton Mifflin Mathematics

The Student Text and Teacher Resource Book

Student Objectives coded for easy tracking and reviewing.

Vocabulary lists help the teacher check that the students know the words needed for each new lesson.

Materials lists remind the teacher of material they may want to use for this lesson. An asterisk indicates materials available in Houghton Mifflin's **K-2 Activity Kit**.

Introductory activity emphasizing prerequisite skills, using concrete experiences.

Lesson plan involving both concrete materials and pictorial representation (semi-concrete).

Teacher's Resource Book page number corresponds to pupil's textbook.

UNIT 2 LESSON 5

Objective N15
Recognize and print the numeral 10.

Vocabulary
Birds, eggs
More than 10, less than 10

Materials
T Numeral Cards 0 to 10
Counters: pennies*
Hands placemats

Introducing the Lesson
Ask the children to show fingers to match a given number up to nine, e.g., "Six." Do this orally and with Numeral Cards to 9.

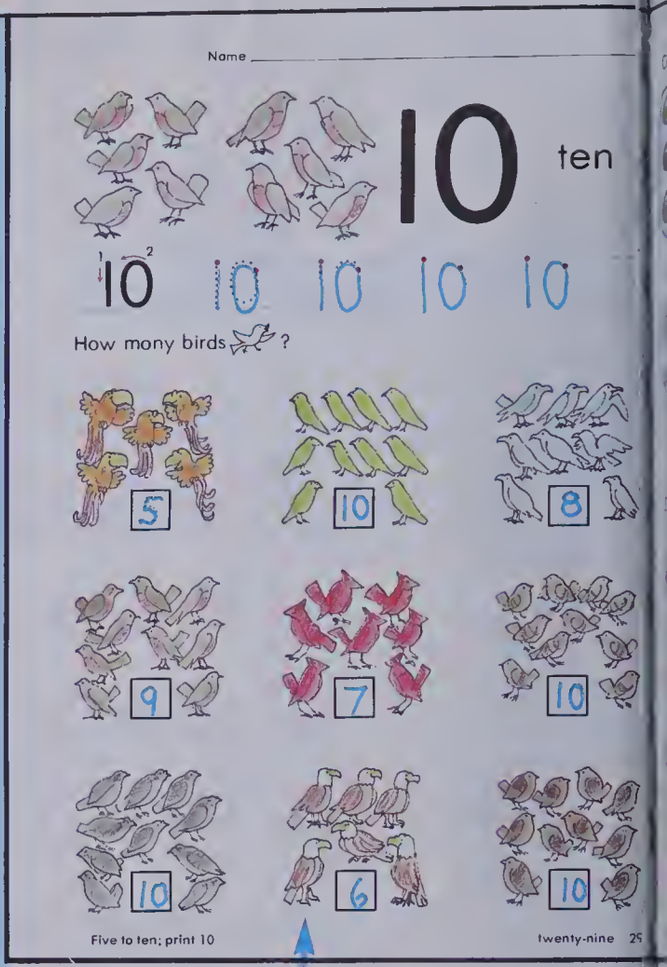
Teaching the Lesson
Ask, "How many fingers in all?" Count to check. Show the Numeral Card for 10. Trace the numeral with the children, saying, "Ten—a one and a zero." Have the children practise tracing one then zero in left-right order in the air. The place-value interpretations are developed later.

Using a hands mat and piles of pennies have the students check the piles to see which ones have ten, less than ten, or more than ten—by trying to place a penny on each finger. "Put one penny on each finger. Are there ten pennies? How many are there?" *Eight.* "Eight is less than ten. How many more pennies do we need to get ten?" *Two.* "Good—nine, ten," placing two more pennies on the fingers.

Give each pupil a hands placemat. Flash Numeral Cards as the students build pennies on the fingers of their mat. Each time, count on with pennies to 10.

Have the children turn over their mats and practise grouping their pennies in sets of various sizes. Start with sets of two or three. "Put ten pennies on your mat. Now separate them into groups of two. How many groups of two did you get? Are there any pennies left over?" Repeat.

29



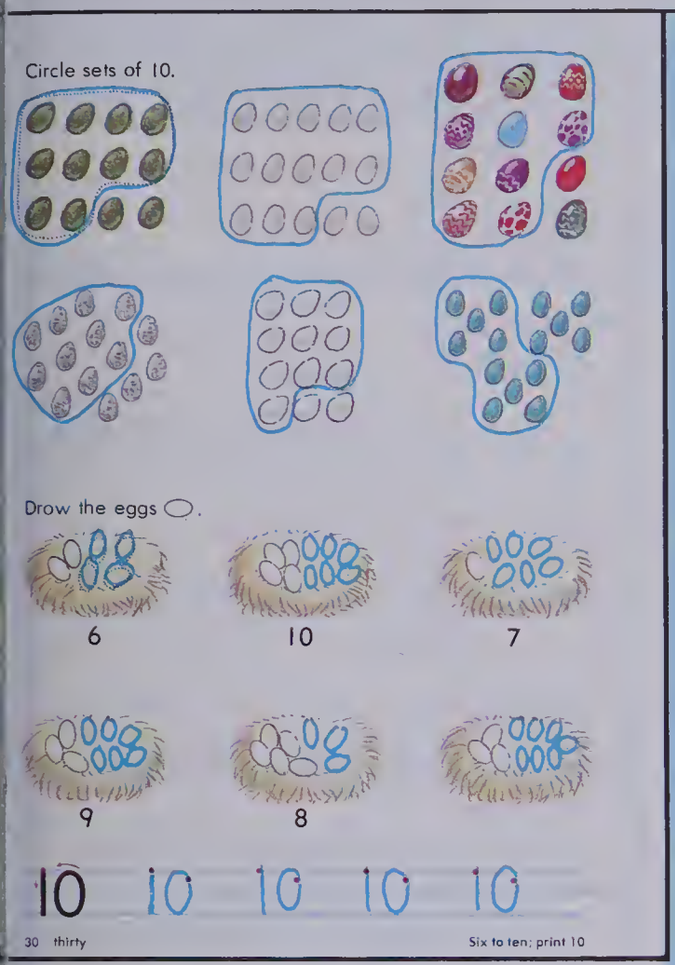
Using the Pages
- Since the children have had experiences printing one and zero separately, emphasize the order of printing one and zero and th use of two dots as starting points for tracing the one, then the ze
- Review the method for the "How many birds ?" exercise on page 29.
- Do a chalkboard example of "Circle sets of 10" at the top of pag 30.
- The nests exercise at the bottom of page 30 emphasizes countin on. Ask, "How many eggs are supposed to be in the nest? How many are there already? How many more are needed? Count to check." Less able children may need help with the exercise.

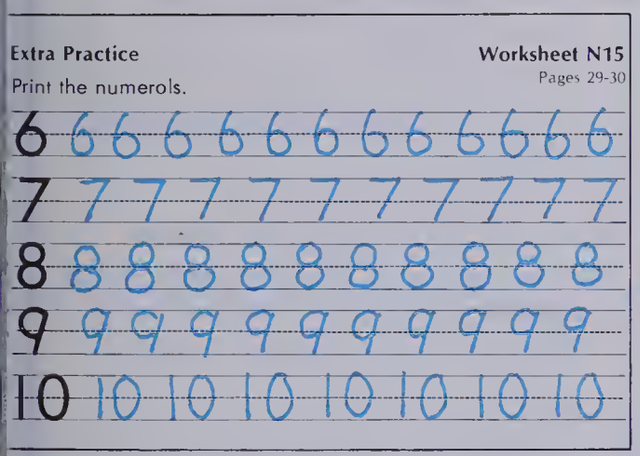
Functional, full colour illustrations.

The **Teacher's Resource Book** *provides black-and-white reproductions of the textbook pages with full answers and annotations.*

Description of workbook exercises aids in teaching the skill and diagnosing problems.

provide a complete learning and teaching package.





Reinforcement

1. Direct the children to trace both of their hands onto paper. Label the fingers from 1 to 10. These hands can be displayed in groups around the room and used for oral counting practice as well as an introduction to counting and grouping by tens.

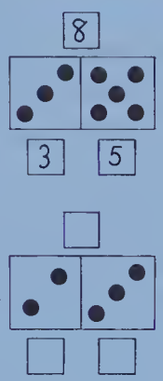


"How many fingers in all?"

2. For additional printing practice of the numerals 6 to 10, provide Acetate Printing Cards and Templates at the Printing Centre.

Enrichment

Using a worksheet of dominoes, ask the students to label how many dots in all, then how many dots on each side.



Provide a real set of dominoes, if possible, as an introduction and follow-up game. Use the regular domino rules.

Problem Solving Activities

Assign Level 1, Unit 2

30

Reinforcement provides alternative types of practice and ideas for reteaching.

Enrichment in Teacher's Resource Book to keep the gifted child involved.

Extra Practice Masters (available separately) are reproduced here for every lesson.

Extra Problem Solving Activities (available separately) for each unit.

Houghton Mifflin Mathematics *was developed by an experienced team of educators and consultants from across Canada.*

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Consultants: Gary Hatcher, Bill Hoppins, Judy Threadgill, George Williams, Peggy Williamson

Houghton Mifflin Mathematics

PRIORITY

PROBLEM SOLVING

- ☐ *Sequenced lessons teach problem solving strategies.*
- ☐ *The unique IDEA strategy keeps your pupils on track.*
- ☐ *Problem solving questions in every lesson maintain performance.*

REAL-WORLD APPLICATIONS

- ☐ *Every unit is developed through a real-world theme.*
- ☐ *Lessons are introduced by a real-world problem.*
- ☐ *Exercises include real-world applications.*

IN-DEPTH DEVELOPMENTAL LESSONS

- ☐ *Each lesson is devoted to a single objective.*
- ☐ *Skills are based upon understanding, using concrete materials.*
- ☐ *Developmental exercises make objectives easy to learn.*

ONE STRAND BLOCK UNITS

- ☐ *Each unit is devoted to the development of one strand.*
- ☐ *Each unit provides thorough practice for objectives.*
- ☐ *Each unit reviews, tests, and reinforces objectives.*

READY-TO-USE TEACHER'S RESOURCE BOOKS

- ☐ *The Resource Book contains detailed lesson plans.*
- ☐ *The Resource Book provides both reinforcement and enrichment activities.*
- ☐ *The Resource Book has complete answers to exercises and practice.*

INDIVIDUALIZED LEARNING MATERIALS

- ☐ *Every unit provides Pre-tests and Post-tests for readiness and assessment.*
- ☐ *Every unit has provisions for remediation and enrichment.*
- ☐ *Every unit has built-in reviews and cumulative reviews*

TESTING AND MANAGEMENT PROGRAMS

- ☐ *The textbook has unit tests and cumulative tests.*
- ☐ *The Resource Book contains extra practice and evaluation material.*
- ☐ *The Resource Book uses coded objectives to establish a diagnostic system.*

YEAR-ROUND MOTIVATIONAL FEATURES

- ☐ *Every lesson has functional and appealing artwork.*
- ☐ *Every lesson has a challenging "Something Extra" including calculator activities and computer literacy.*
- ☐ *Every unit has an interesting child-oriented theme.*

Book 1	
1-98001	Pupil's Workbook
1-98011	Teacher's Resource Book
1-98021	Testing and Practice Masters
1-98031	Problem Solving Activities
Book 2	
1-98002	Pupil's Workbook
1-98012	Teacher's Resource Book
1-98022	Testing and Practice Masters
1-98032	Problem Solving Activities
Book 3	
1-98003	Pupil's Textbook
1-98013	Teacher's Resource Book
1-98023	Testing and Practice Masters
1-98033	Problem Solving Activities
Book 4	
1-98004	Pupil's Textbook
1-98014	Teacher's Resource Book
1-98024	Testing and Practice Masters
1-98034	Problem Solving Activities
Book 5	
1-98005	Pupil's Textbook
1-98015	Teacher's Resource Book
1-98025	Testing and Practice Masters
1-98035	Problem Solving Activities
Book 6	
1-98006	Pupil's Textbook
1-98016	Teacher's Resource Book
1-98026	Testing and Practice Masters
1-98036	Problem Solving Activities

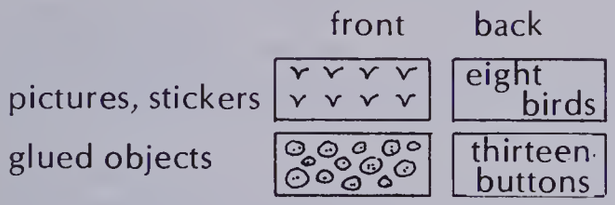
Houghton Mifflin Canada Limited | 150 Steelcase Road West, Markham, Ontario L3R 1B2
(416) 475-1755

Materials

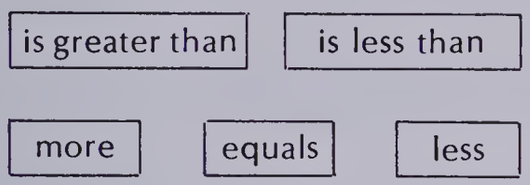
Numeral Cards: approximately 12 cm by 15 cm



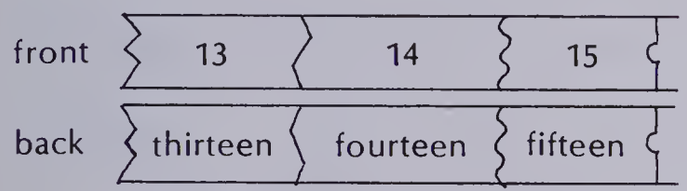
Picture Set Cards



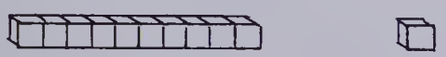
Comparison cards:



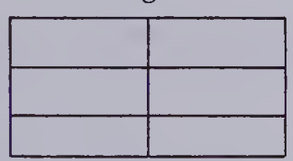
Numeral-word jigsaw puzzle: approximately 12 cm by 15 cm interlocking cards



Wall number line to 20.
Floor number line to 20.
Floor numeral cards to 20.
Place-value blocks:



Individual chalkboards gridded for place value work:



pencils
chalk
blocks
pennies*
chart paper
paper clips
felt cutouts
plastic sticks*
interlocking cubes
rulers
crayons
graph paper*
bingo chips*
dimes*
scissors
catalogs
felt board
lima beans

*Available in the Houghton Mifflin K-2 Activity Kit.

About This Unit

Unit 1 contains a thorough treatment of numeration concepts and skills from 0 to 20. It is assumed that most children will have acquired these numeration concepts and skills in grade 1:

1. Rote counting and rational counting to 10 or 20;
2. Printing numerals to 10 or 20;
3. Familiarity with the vocabulary of quantity and position (e.g., none, some, a few, all, above, below, beneath, etc.).

For most students, Unit 1 will function as a review. However, it is a fresh and detailed treatment and will provide many students with new insights and a deeper understanding of number. The following numeration topics are covered in the unit:

1. Facility with counting between 0 and 20; counting forward and backwards; counting on from any number, particularly 10;
2. Comparing numbers up to 20; determining one more, one less, least, and most;
3. Understanding numerals from 10 to 20 in terms of place value; relating place value and counting on techniques through number blocks and coins;
4. Interpreting and constructing picture graphs and bar graphs; applying the numeration skills of counting on and comparisons in analyzing information on a graph.

The choice and treatment of the topic "Numerals to 20" in Unit 1 is pedagogically sound and eminently practical. Within the context of the grade 2 program it serves four functions:

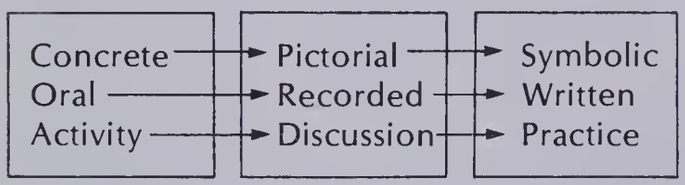
1. Beginning with a basic review topic ensures most students of a successful entry into the grade 2 program.
2. Within familiar conceptual surroundings students adjust most comfortably to a somewhat more demanding environment than that encountered in grade 1, namely, a more varied and slightly more concentrated page format and more written directions. It is recommended that the student's involvement in these elements in the grade 2 workbook be explicitly fostered through Units 1 to 4.

3. The addition and subtraction units presuppose varied experience with numeration skills to 20, particularly counting and comparing. These, in fact, are provided by the lessons of Unit 1, which incorporate discussion, active investigation, and the association of concepts through the manipulation of concrete materials along with symbolic work.

4. Finally, Unit 1 is a gentle approach to fundamentally difficult, but quite essential, numeration concepts and skills. The place value of a number is the central pillar of an elementary mathematics program. Elementary students rarely are ready to understand place value. They require a slow, thorough, program involving the manipulation of concrete materials. Their development through the grades requires patience and the co-ordinated efforts of teachers with knowledge of the ubiquitous applications of place-value skills in arithmetic. The grade 2 program has been carefully designed to satisfy these considerations.

 Unit 1 uses a developmental approach consistent with current research.

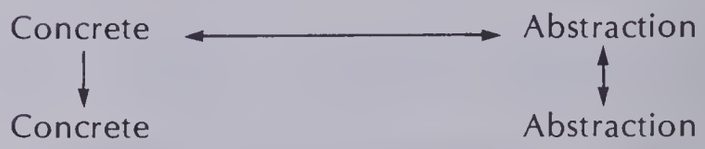
PATTERN OF DEVELOPMENTAL EXPERIENCES



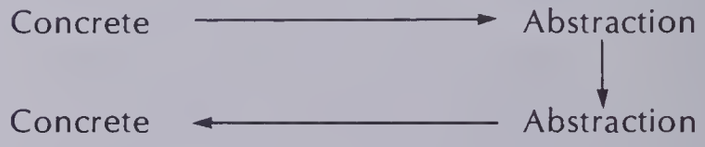
Even when a student is successfully practising a skill in written symbolic form, it still is vitally important to nurture his or her abstract understanding through the manipluation of concrete materials, oral interaction with the teacher and peers, and varied, meaningful activities. Otherwise, two dangers arise:

1. that subsequent complex skills will rest upon tenuously held, abstract understandings;
2. that the connections and applications of mathematics to the real world will become increasingly difficult to establish.

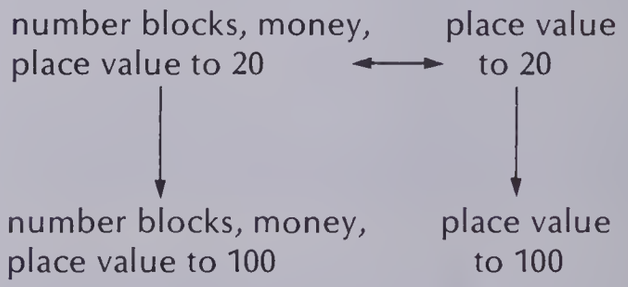
A SOUND MODEL



AN UNSOUND MODEL



For example, Units 1 and 3 have been structured so as to relate experience and conceptual development as illustrated in this diagram.



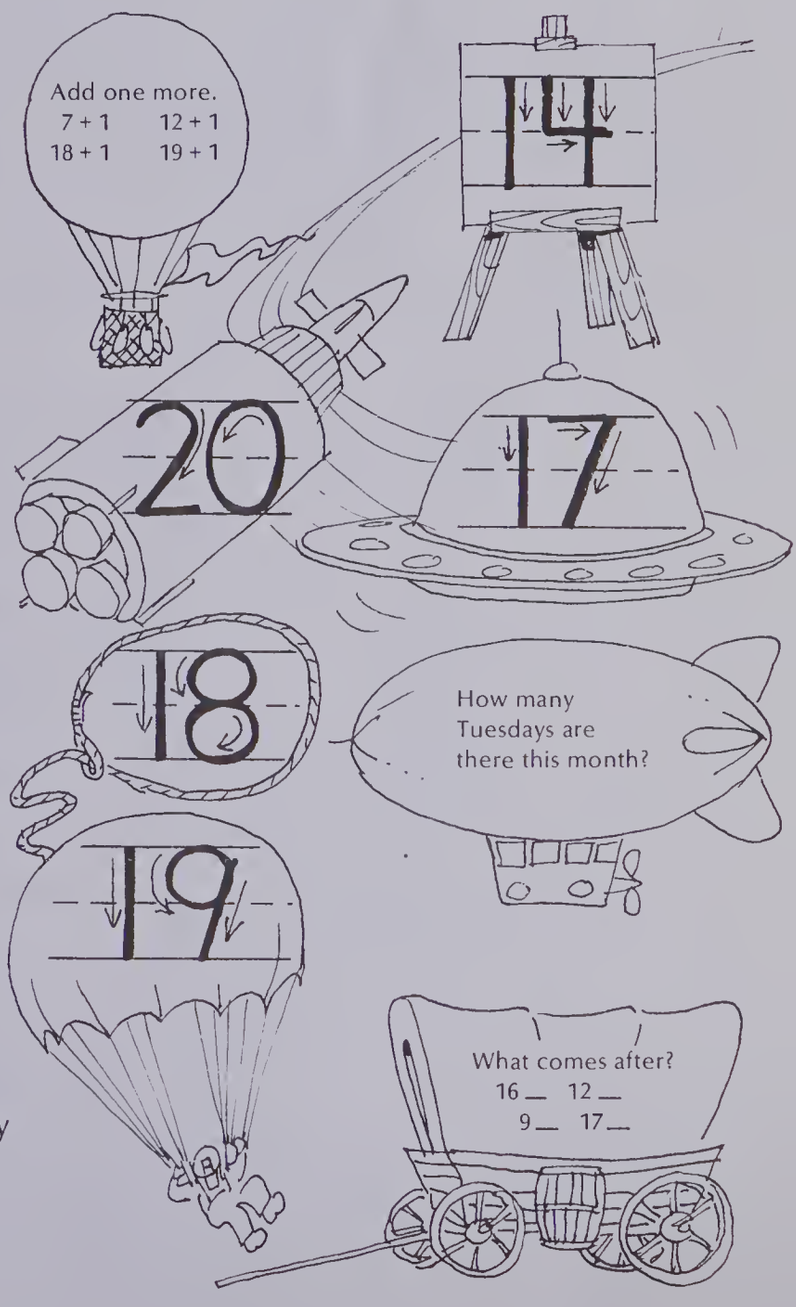
Ideas

1. Each unit in *Houghton Mifflin Mathematics* has a mathematical focus and an integrative theme. The theme of Unit 1 is *Children at Play*. Students in the primary grades can and do use mathematical concepts in many aspects of their play. Below are summarized the thematic subjects of each lesson with suggestions for possible extensions. Don't overlook your students' imaginations; encourage them to devise playful math activities.

Lesson 1:	
water play	Water Measurement Centre equipped with cans, cups, funnels, tubing, litre and half-litre containers
Lesson 2:	
painting, paper crafts	geometry collages, *Make a Picture of Me* challenges, simple paper folding
Lesson 3:	
construction, puzzles	building with blocks and interlocking materials, toothpick sculpture, model communities
Lesson 4:	
party games, mazes	*I Spy, 10 Questions, Arithmetic Bees*, etc., shape labyrinths
Lesson 5:	
moving on wheels	timing races on bikes or skates, metre trundle wheel
Lesson 6:	
fantasies, play acting	puppet shows with a rehearsal sequence, acting out word problems
Lesson 7:	
gym games	geometry targets, measuring running and jumping contests, active math games
Lesson 8:	
play money	classroom store, using catalogs, making change
Lesson 9:	
carnival games	games of dexterity, score keeping, informal probability
Lesson 10:	
outdoor fun	measurement/nature scavenger hunt, community maps, simple orienteering

2. Display the appropriate calendar each month. Use it frequently in group discussion to develop the students' understanding of number and time concepts. Relate the math work being studied in each unit to the calendar discussion. For example:
 How many Saturdays are there this month?
 Which of these months has more days?
 What date will it be in 6 days?
 How many Mondays come after the 4th?

3. Work cards and direction cards motivate better when they appear on interesting figures. Transform some of your "good activities" that don't seem to work to a more appealing format and watch the difference! Here are figures that are appropriate with this unit theme *Children at Play*.



4. Develop one graph each week. Let the subject of the graph spring from activities or discussions that arise naturally in class. Remember that graphing provides many learning opportunities.
 1. Graphs display information in a concise, visual form.
 2. Graphs show relationships and encourage comparisons.
 3. Graphs may be discussed and interpreted.
 4. Graphs provide data and situations suitable for computation practice through oral and written word problems.
 5. Graphs integrate subjects and relate to children's interests.

This list provides you with possible graphing topics; many others will evolve naturally in your own teaching situations.

A GRAPHING DIARY FOR ONE YEAR

September	
1. birthday	student candle on cake
2. weather	day by day pictograph
3. tooth chart	names on teeth
4. leaves	colours or kinds, real objects
October	
1. squirrels or chipmunks	picture graph
2. lunch: home or school	sticker bar graph
3. UNICEF	sticker bar graph
4. scary or not scary costume	picture graph
November	
1. wet weather shoes	real graph
2. hockey cards	sticker bar graph
3. hair colour	picture graph
4. favourite cereal	box tops
December	
1. favourite reindeer	name bells on reindeer
2. desired gift catalog	picture graph
3. food favourites: turkey, ham, etc.	picture graph
January	
1. favourite snow game	angels, snowball, etc.
2. like snow or not	bar graph
3. snow-to-water estimation	centimetres of water in a jar
4. favourite classroom song	picture graph
February	
1. want to be: older, same age	bar graph
2. valentines we made	heart bar graph
3. height	body outline display
4. streets we live on	map "graph"
March	
1. pets	picture graph
2. favourite shade of green	mixed paints picture graph
3. brothers and sisters	sticker bar graph
4. favourite sports	bar graph
April	
1. classroom egg hunt	real graph
2. bedtimes	bar graph
3. flowers in your garden	picture graph
4. favourite young animal	bar graph
May	
1. kinds of TV program watched	bar graph
2. a classroom plant's growth	picture graph
3. colour of shoes	real graph
4. kinds of wheeled vehicles	picture graph
June	
1. beach field trip collections	real graph
2. favourite vegetable	picture graph
3. favourite water activity	bar graph
4. summer activity	bar graph

Name _____

Pretest **Unit 1**

Count on to 20.

9 10 11 12 13 14 15 16 17 18 19 20

Count down to 10.

20 19 18 17 16 15 14 13 12 11 10

Find one more.

13 14 6 7 19 20

Find one less.

9 10 14 15 18 19

Which is least?

15 8 (6) 12	19 17 20 (16)	13 (11) 15 12

Which is greatest?

5 (9) 7 6	14 10 16 (17)	19 15 (20) 18

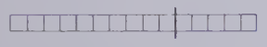
How many?



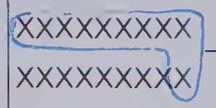
1 tens 6 ones
16



1 tens 4 ones
14



1 tens 5 ones
15



1 tens 8 ones
18



17¢



14

Name _____

Post-test **Unit 1**

Count down to 10.

20 19 18 17 16 15 14 13 12 11 10

Count on to 20.

10 11 12 13 14 15 16 17 18 19 20

Find one more.

14 15 9 10 17 18

Find one less.

10 11 19 20 14 15

Which is less?

(3) or 6	16 or (13)	9 or (7)	17 or (9)

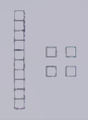
Which is greater?

4 or (7)	(17) or 14	(8) or 6	(16) or 8

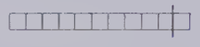
How many?



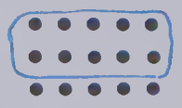
1 ten 2 ones
12



1 ten 4 ones
14



1 ten 1 ones
11



1 ten 5 ones
15



15¢



13

UNIT 1 LESSON 1

Objective N1

Recognize and write the numerals 0 to 9.

Vocabulary

Set, zero, one, two, ..., nine

Direction words: Pick how many.
How many ...?
Colour ...

Materials

Picture Set Cards, 0 to 9:



Crayons

Introducing the Lesson

Ask the children to open their workbooks to page 1. Use the picture as a springboard to determine other sets of objects that might be used while playing. Discuss how numbers and counting might be helpful.

Teaching the Lesson

Write the numerals 0 to 9 in a row on the chalkboard. Show the class the front of a Picture Set Card and ask for a description.

 *Two bugs.*

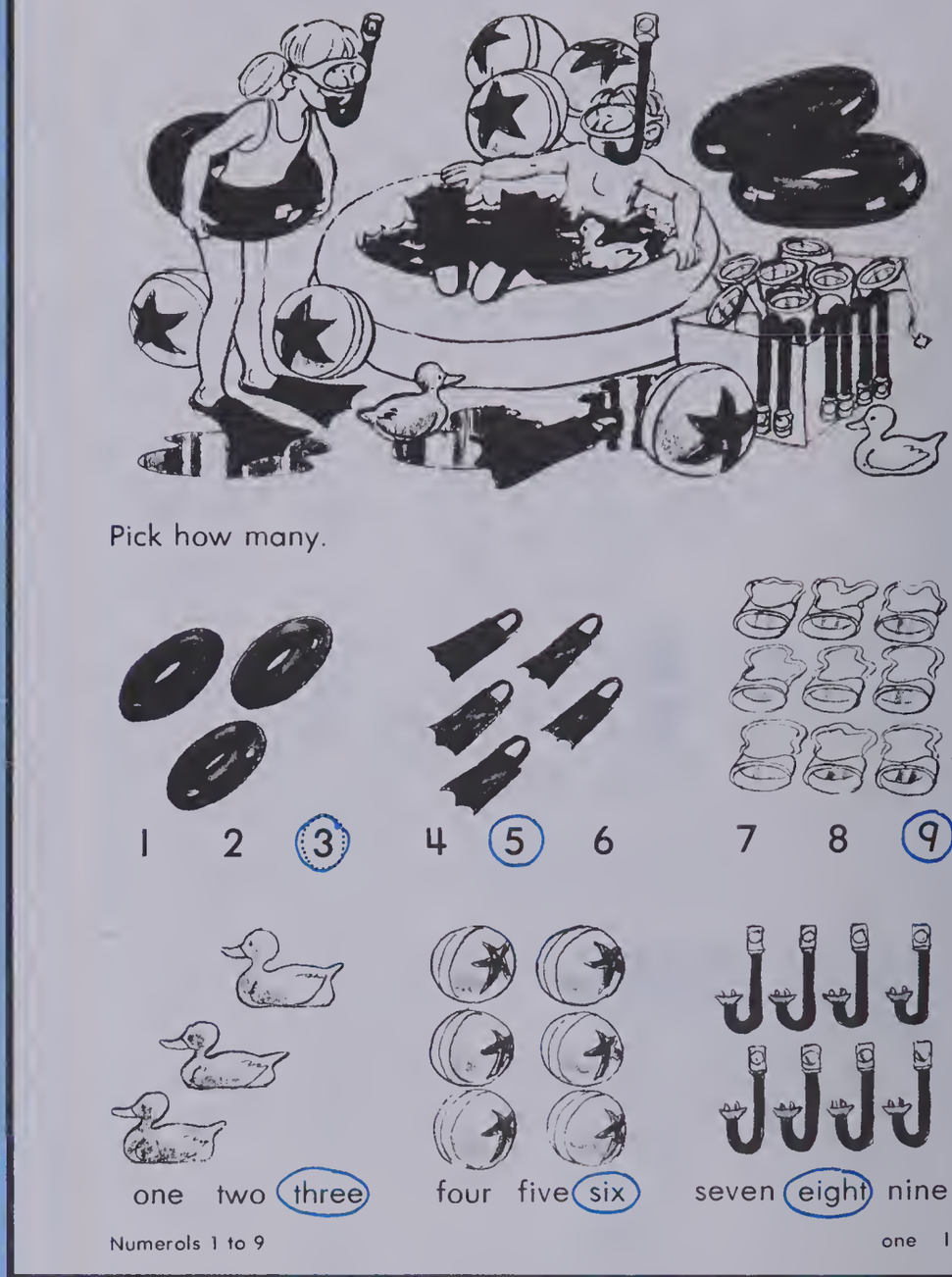
Print the description beneath the appropriate numeral on the chalkboard. Stress the reading and spelling of the *written form*. Turn the card over to check the answer and then place it in the chalktray directly below the numeral and the suggested description.



2
Two bugs.

Continue the above procedure until all the numerals but zero have been used. Talk about the difficulty in making Picture Set Cards for zero.

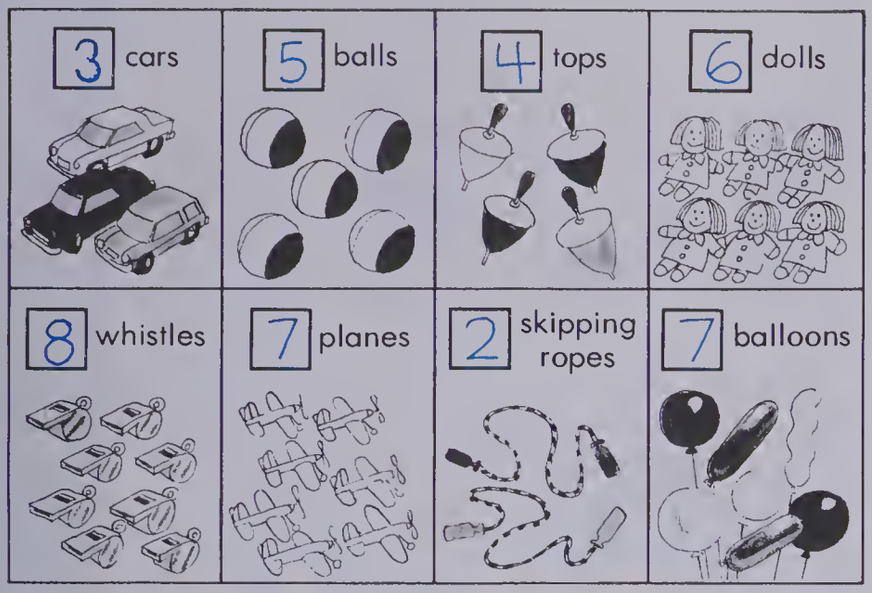
Use both sides of the Picture Set Cards for group and individual counting and spelling practice.

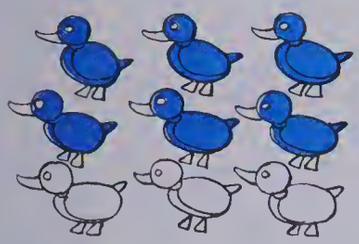


Using the Pages

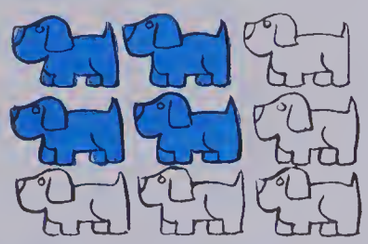
- Show the students that the numerals and the number words on page 1 are in the same order as those still on the chalkboard. The exercises ask the student to count objects in a set and circle a numeral or a number word that tells how many.
- Check that the printed directions on page 2 are understood. Crayons are needed for the bottom of the page.

How many toys?

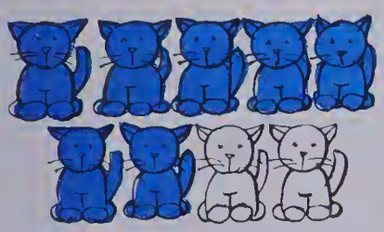




Colour **six** birds.



Colour **four** dogs.



Colour **seven** cats.

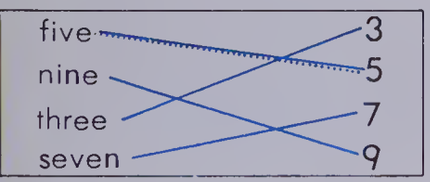


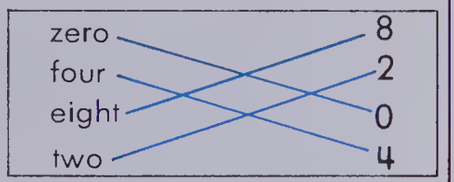
Colour **nine** bunnies.

Extra Practice

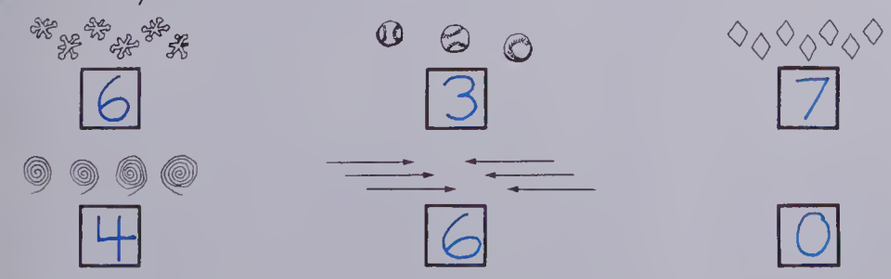
Worksheet N1
Pages 1-2

Match.





How many?



Reinforcement

1. Using the items pictured on page 1, ask the students to look for the similarities in the amounts pictured at the top and at the bottom of the page. List their findings on a chalkboard chart writing the amount as a numeral and as a number word.

top of page	bottom of page
3 	Three ducks
8 	eight snorkels

2. Pass out Picture Set Cards to small groups of students. Ask them to look only at the *back*, where the number words are written, and to draw the appropriate sets of objects. After a set is drawn the student should write the appropriate number word. The cards can then be turned to the front and the two pictured sets matched one-to-one.

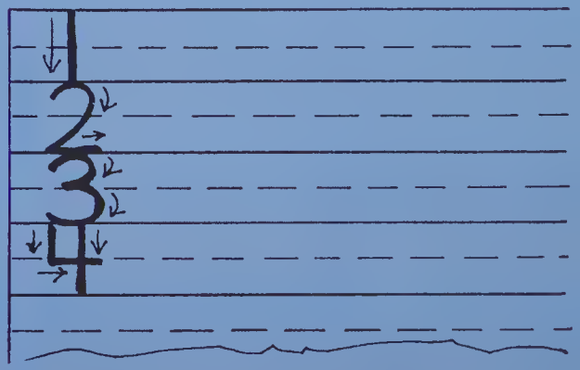
3. Some students may have difficulty with the spelling of number words. Show these students the *front* of each Picture Set Card and ask them to spell the number of objects they see. The card can be turned over as a check.

Enrichment

1. Extend the picture set/number word idea by letting the students devise their own cards which can use more involved descriptions. Let their imaginations soar!

six frogs with blue spots and hats	nine seven with cheese and two with lettuce

2. Provide a worksheet which gives printing practice for the numerals 0 to 9. Encourage the students to follow the direction arrows as they form each numeral.



UNIT 1 LESSON 2

Objective N2

Order numbers 0 to 9.

Vocabulary

In order, zero, one, two, ..., nine
Direction words:

Fill in the missing numbers.

Read and print the number.

Materials

Numeral Cards 0 to 9
Numeral-word jigsaw puzzle 0 to 9
Scissors

Introducing the Lesson

Display the Numeral Cards in the wrong order in the chalkboard tray. Have a student discover the errors and put the numbers **in order**.

Teaching the Lesson

Pointing to the 0 Numeral Card, ask the students to suggest a spelling for "zero". Print the correct version above the 0 card on the chalkboard. Continue discussing and printing the number words through nine.

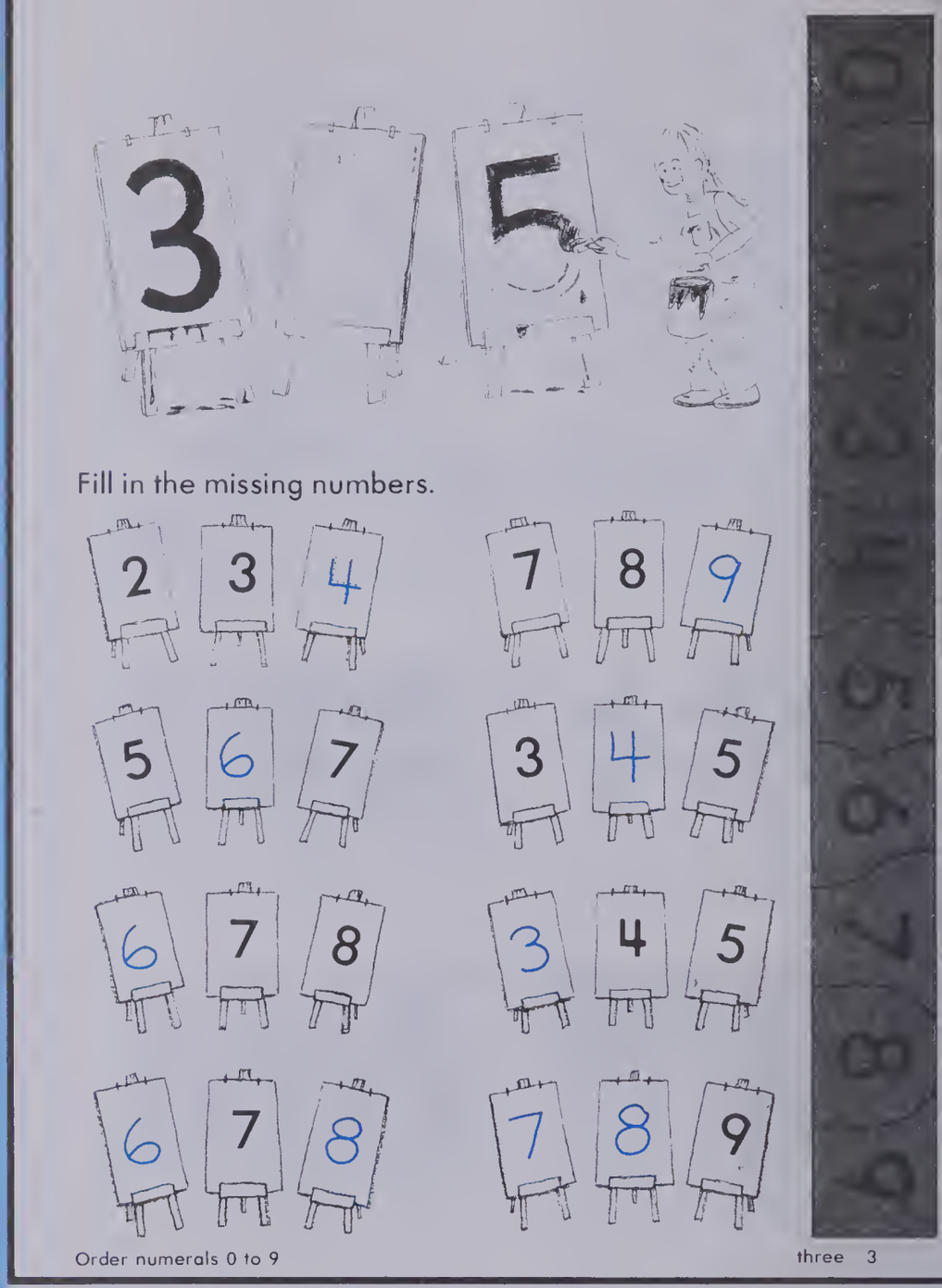
Remove the Numeral Cards and mix them. Let several pupils take turns placing a Numeral Card beneath the correct word that was just printed on the chalkboard.

seven 7 four 4

Erase the chalkboard number words but leave the Numeral Cards in the chalkboard tray. Mix the numeral-word jigsaw cards. Show a word and ask someone to say the word and place it over the correct number in the tray.

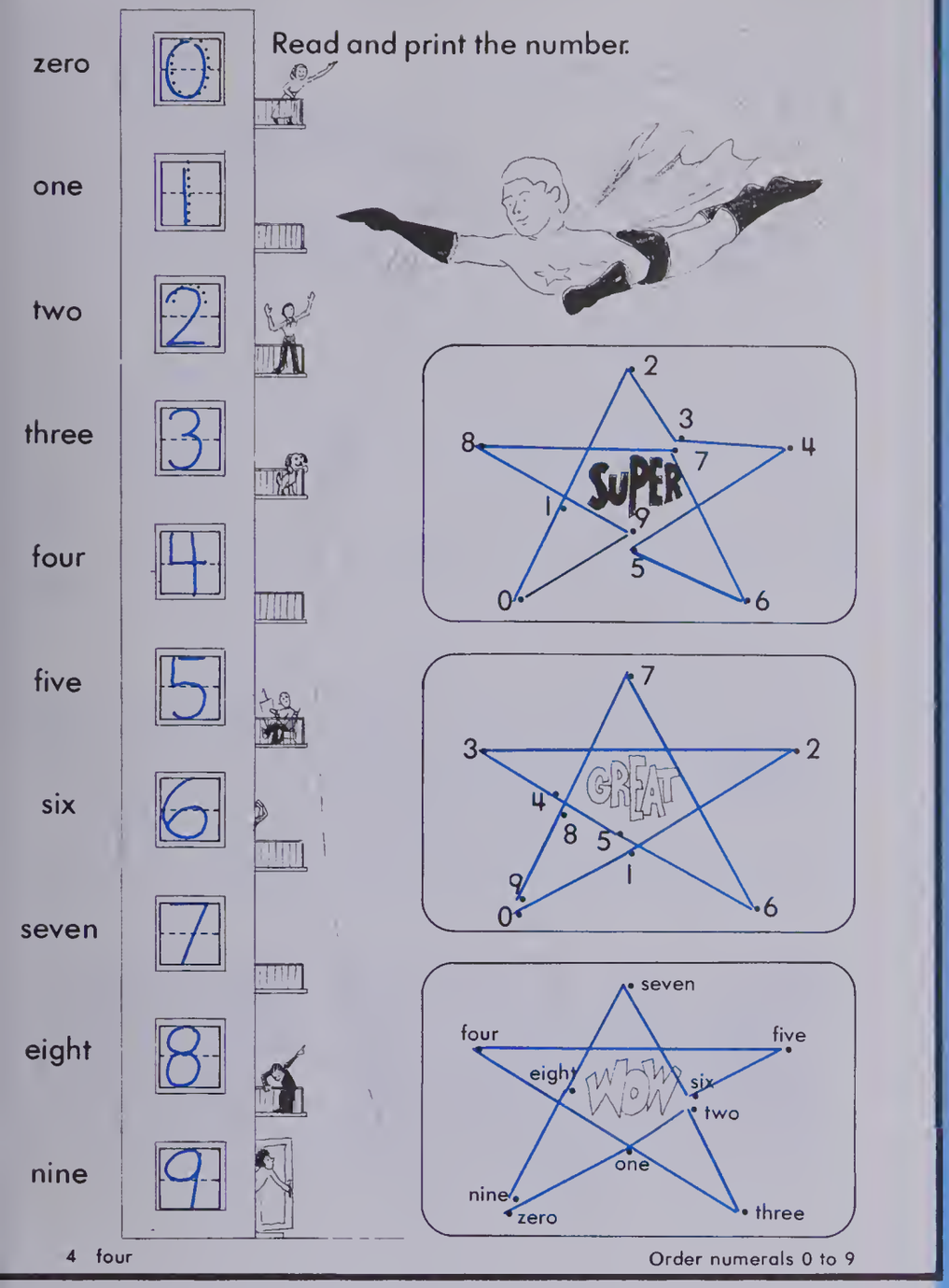
nine 9 six 6

Mix up the number-word jigsaw pieces and have the students fit the pieces together. As they do this they are *ordering* the numbers if the front of the puzzle is used or ordering the numerals if the back is used.



Using the Pages

- Discuss the printed directions on page 3. Point out the *order* of the numbers made by the children painting. Relate the work on page 4 to the lesson activity with the Numeral Cards.
- Draw attention to the ordering puzzle on page 3 which may be cut apart after the pages are finished. Encourage the students to decorate, cut out, and wear the star badges that can be made from the dot puzzles on page 4.



Order numerals 0 to 9

Reinforcement

1. Prepare and display 10 cm × 30 cm workcards which require the students to find the missing numbers in counting sequences.

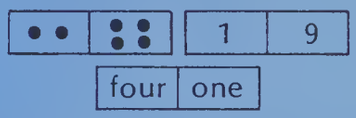
0	1				5
		6			9

Encourage the students to make similar cards.

2. Provide each student with a strip of stiff paper. Ask them to number from 0 to 9 along the strip and draw jagged lines between the numbers. Each jigsaw puzzle can then be cut out, mixed up, and put back together again.

The number words from zero to nine can also be used for this ordering activity.

3. Prepare three kinds of domino cards using dots, numbers, and number words. Let the class play dominoes matching all three kinds of domino cards.

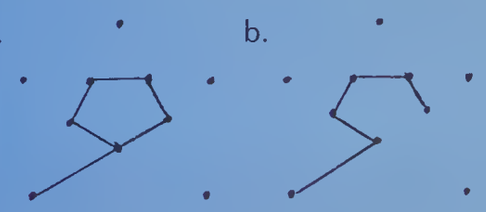


Enrichment

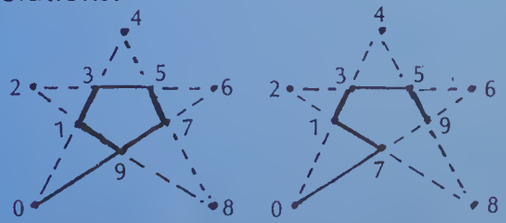
1. Discuss the concept and purpose of "countdowns". Give several students practice counting backwards in order to start a race or to launch a toy moon rocket. Let these students demonstrate the skill to the class.

2. Copy the patterns below on paper or plastic-covered cardboard. Challenge some students to devise "star badge" dot-to-dot puzzles. By placing the numbers 0 through 9 in various positions several solutions are possible.

a. b.



Solutions:



Extra Practice **Worksheet N2**

Pages 3-4

Fill in the missing numbers.

4	5	6
2	3	4

7	8	9
4	5	6

6	7	8
7	8	9

Fill in the missing letters.

f**o**ur f**i**ve thr**e**e o**n**e ni**n**e

si**x** s**e**ven **Z**ero t**w**o **t**en

Print the number word.

ufro four eevsn seven ixs six inen nine

reeht three veif five wot two hiteg eight

UNIT 1 LESSON 3

Objective N3

Count on from 10 and write numerals to 20.

Vocabulary

Count on from 10, zero, one, ..., twenty
Direction words: Help count Ned's playthings. Who is at the party?

Materials

Interlocking cubes
Number line 0 to 20

Introducing the Lesson

Build a tower using twelve interlocking cubes. Ask the students to find out how many cubes are in the tower. They can count the cubes or match each cube to the numbers on a number line to realize that there are twelve in all.

Build several other cube towers and have the children count the cubes or match them to a number line to find the total number of cubes used.

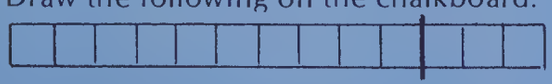
Teaching the Lesson

Build a second tower with twelve interlocking cubes. Remove two cubes to make a small tower beside the big one. Have the students determine that the large tower has 10 cubes and the smaller one has 2 cubes. Demonstrate **counting on from 10** (instead of the place value approach) as a way to count all the cubes without starting at 1.

 "Ten"  "Eleven, twelve."

Continue adding cubes to the smaller tower and letting several students practise counting on from 10. Ask them to check their results by counting from 1.

Draw the following on the chalkboard.



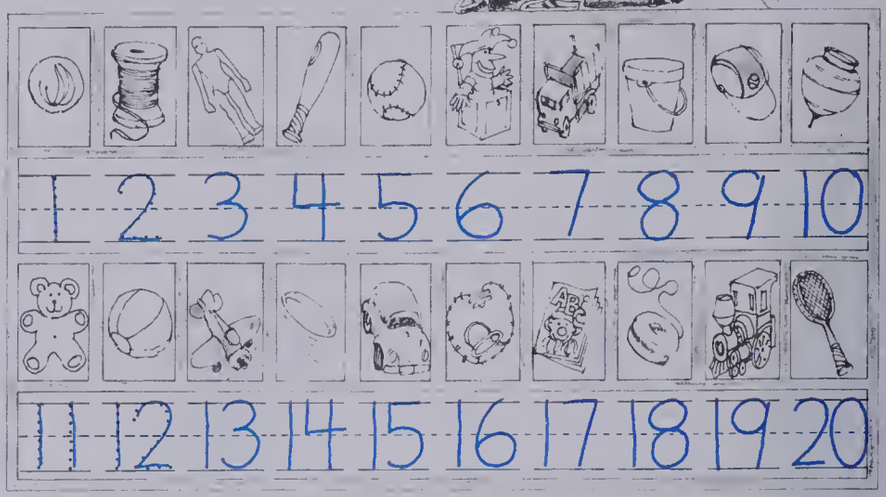
Determine that there are 10 squares to the left of the vertical line. Then ask someone to count on from 10.

Ten—eleven, twelve, thirteen.

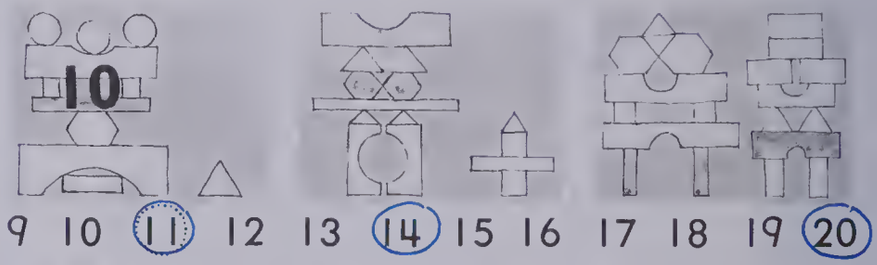
Practise counting on from 10 with a few other chalkboard examples.

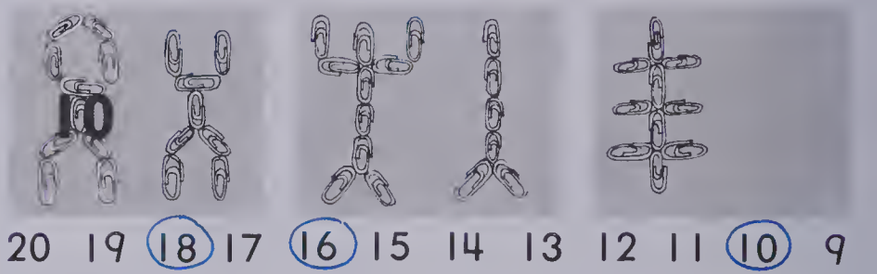
Help count Ned's playthings.





Show how many.





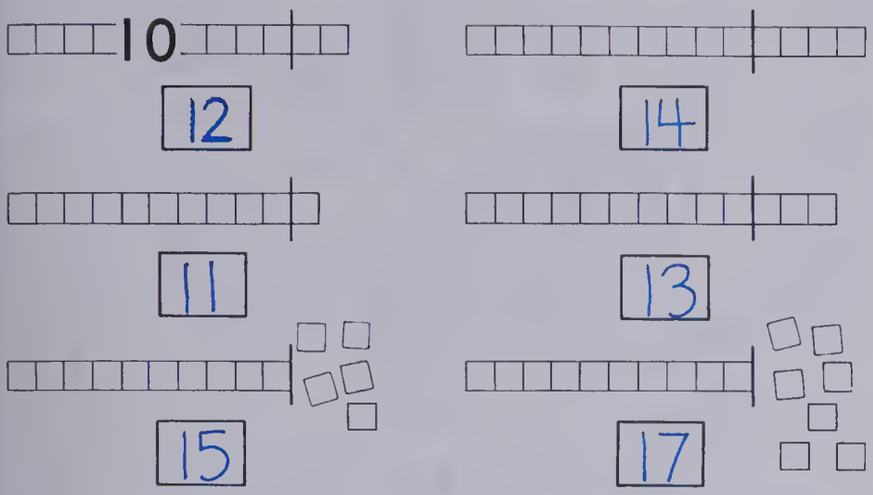
Numerals to 20

five 5

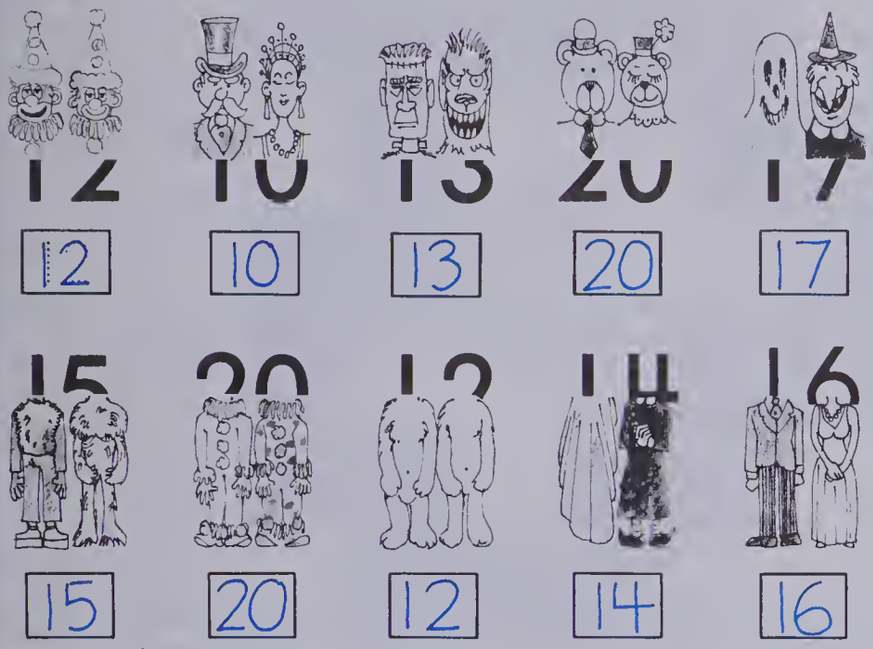
Using the Pages

- As the students print the numerals 1 to 20 at the top of page 5, point out the way each numeral is properly formed. In the exercises at the bottom, explain that the first group is always 10.
- The exercise at the top of page 6 is a continuation of the lesson's activities. The students are to decide which numerals are masqueraded at the bottom of page 6 and then print them. In the first row, the tops of the numerals are disguised. In the second row, the bottoms are disguised. The rows do not match up in any way.

Tell how many.



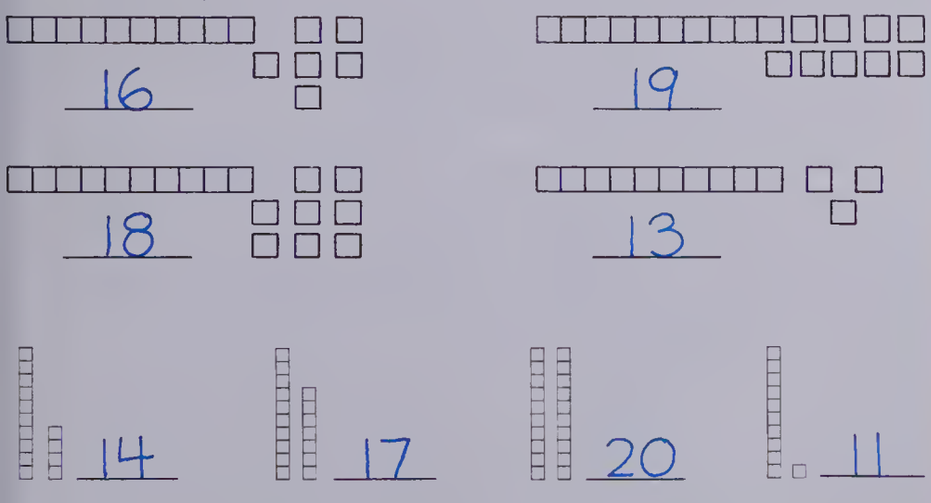
Who is at the party?



Extra Practice **Worksheet N3**

Pages 5-6

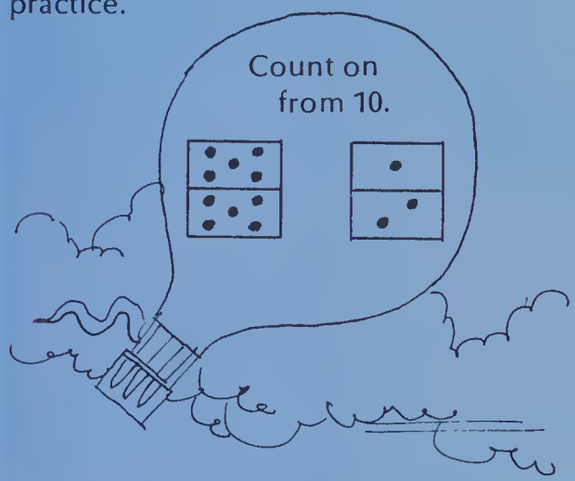
Tell how many.

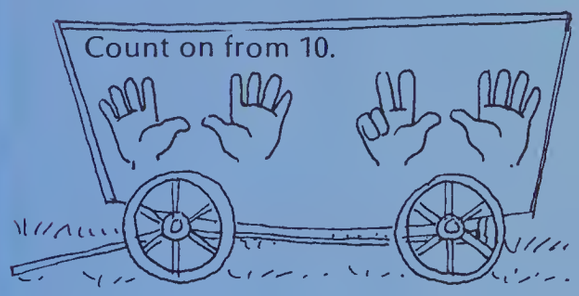


Reinforcement

1. Ask the students to make designs that use just **ten** objects and to glue them on construction paper. These objects can be drawn or be made from straws, paper clips, stickers, etc.

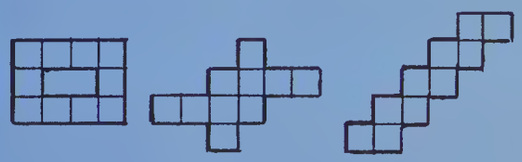
2. Make workcards of interesting shapes (as suggested in the Ideas section of the introduction) with *counting on from 10* exercises. Display them in the classroom for further student practice.





Enrichment

1. Have the students investigate making figures with ten small squares. Let them add their own examples to a display.



2. Encourage the children to experiment with disguising numbers, letters, and words.



3. Provide a worksheet which gives printing practice for the numerals 10 to 20. Stress proper numeral formation and spacing between two-digit numerals.

UNIT 1 LESSON 4

Objective N4

Count and order numbers to 20.

Vocabulary

After, before, between
Direction words: What comes **after**?
before? **between**?
Help Beth paint from 0 to 20.

Materials

Place value blocks
Number line to 20
Large floor numeral cards from 10 to 20 Scissors

Introducing the Lesson

Review counting on from 10 with the place value blocks. Say a numeral between 10 and 20, e.g., 15. Show the ten *rod* and ask someone to show how many one *cubes* are needed beyond 10.

Teaching the Lesson

Attach the number line to the chalkboard and write **before**, **between**, and **after** above the number line.

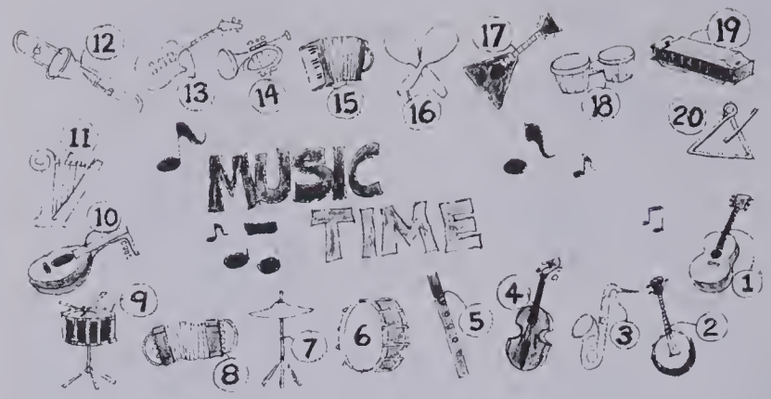
Explain the meaning of each term as you ask the following kinds of questions:

"What comes *before* 11?"
"What comes *between* 16 and 18?"
"What comes *after* 19?"

Play this "Before, Between, and After" game.
Place the floor numeral cards in a circle with a fairly large gap between the 10 and 20. A child stands behind each numeral. A leader stands in the middle or off to the side.

The leader asks a question, such as, "What number comes after 15?" The student standing behind the numeral that is correct should respond quickly, "16 comes after 15."

The leader can phrase the question with *before*, *between*, or *after* and any appropriate numbers. After each question is answered successfully, all the players move counter clockwise (to the number that comes *before*) and play resumes.



What comes **after**?

13	14	19	20	17	18	12	13

What comes **before**?

18	19	14	15	19	20	10	11

What comes **between**?

12	13	14	15	16	17	18	19	20

Order numerals to 20 seven 7

10 11 12 13 14 15 16 17 18 19 20

Using the Pages

- Explain that the numbered musical instruments at the top of page 7 match the numbered instruments at the bottom of the page. The students are to print the numeral that comes *after*, *before*, or *between*. Discuss the musical instruments that come *after*, *before*, or *between*. Students may wish to draw them in the spaces provided as they are discussed.
- The top of page 8 is a variation of a "peanut scramble". Discuss how marking each of the three items as it is counted helps to avoid counting the same object twice.
- The ordering puzzles at the sides of pages 7 and 8 may be cut apart after the pages are finished.

10 11 12 13 14 15 16 17 18 19 20



How many ? 12

How many ? 20

How many ? 15

Help Beth paint from 0 to 20.

0	1	20	19	18	20
5	2	19	15	17	16
4	3	18	17	12	15
5	2	5	16	13	14
6	7	6	11	12	16
5	8	9	10	14	15

Order numerals to 20

Extra Practice **Worksheet N4**

Pages 7-8

What comes after?

6 7 12 13 18 19 3 4

15 16 19 20 13 14 9 10

What comes before?

1 2 14 15 10 11 17 18

7 8 19 20 12 13 16 17

What comes between?

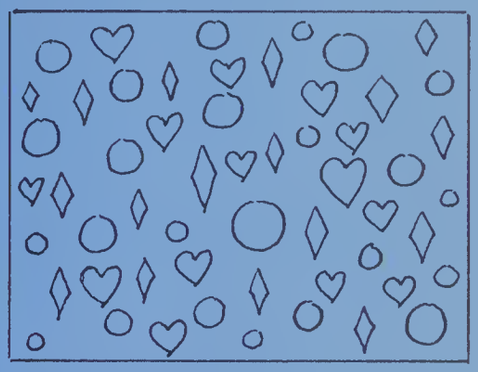
16 17 18 4 5 6 14 15 16 9 10 11

0 1 2 17 18 19 11 12 13 15 16 17

Reinforcement

1. After the children have cut out the ordering puzzles on the sides of pages 7 and 8, ask them to mix the pieces and put them back in order again. The puzzle can be ordered from either the numeral or the place-value block side.

2. Make plastic-covered work cards similar to this:



How many ?

How many ?

How many ?

Enrichment

1. Introduce the number words for 10 through 20. Devise matching games or number line puzzles with them.

1. domino matching

11	16
sixteen	twelve

2. number line puzzle

eleven twelve thirteen

2. Play the Number Path game. The materials required are a blank cardboard grid of 6 by 6 squares, as on page 8, and 23 squares labelled with "start", "stop", and the numerals 0 to 20. Player 1 lays down the "start" and "stop" squares on any two blank squares on the grid. Player 2 uses the numeral cards, 0 to 20. The object is to lay down the "0" card on the "start" square and make a path of numbers in order so that the last number (19 or 20) covers the "stop" square. No diagonals or jumps are allowed and no two numbers can occupy the same square. Player 2 may decide to discard the "20" card *before starting*. When one round is finished, Player 2 lays down the "start" and "stop" squares for Player 1.

UNIT 1 LESSON 5

Objective N5

Group tens and ones and write numerals 10 to 20.

Vocabulary

Tens, ones, group by tens and ones, set of ten, tens place, ones place

Materials

Long rope
Felt board, felt cutouts, yarn

Introducing the Lesson

Choose twelve students to stand. Ask someone to count them and to write on the chalkboard how many students there are. Circle ten of them with a rope. Explain that there is one **set of ten** students and two are left over (called 2 **ones**). Record this *grouping by tens and ones* on the chalkboard.

How many students?
12 or 1 ten 2 ones

Repeat this procedure for sets of up to twenty students. Record the grouping by tens and ones for each.

Teaching the Lesson

Using a feltboard, felt cutouts, and yarn, continue grouping sets of objects by tens and ones. Record each example on the chalkboard.

tens	ones	
1	4	or 14
1	7	or 17
2	0	or 20

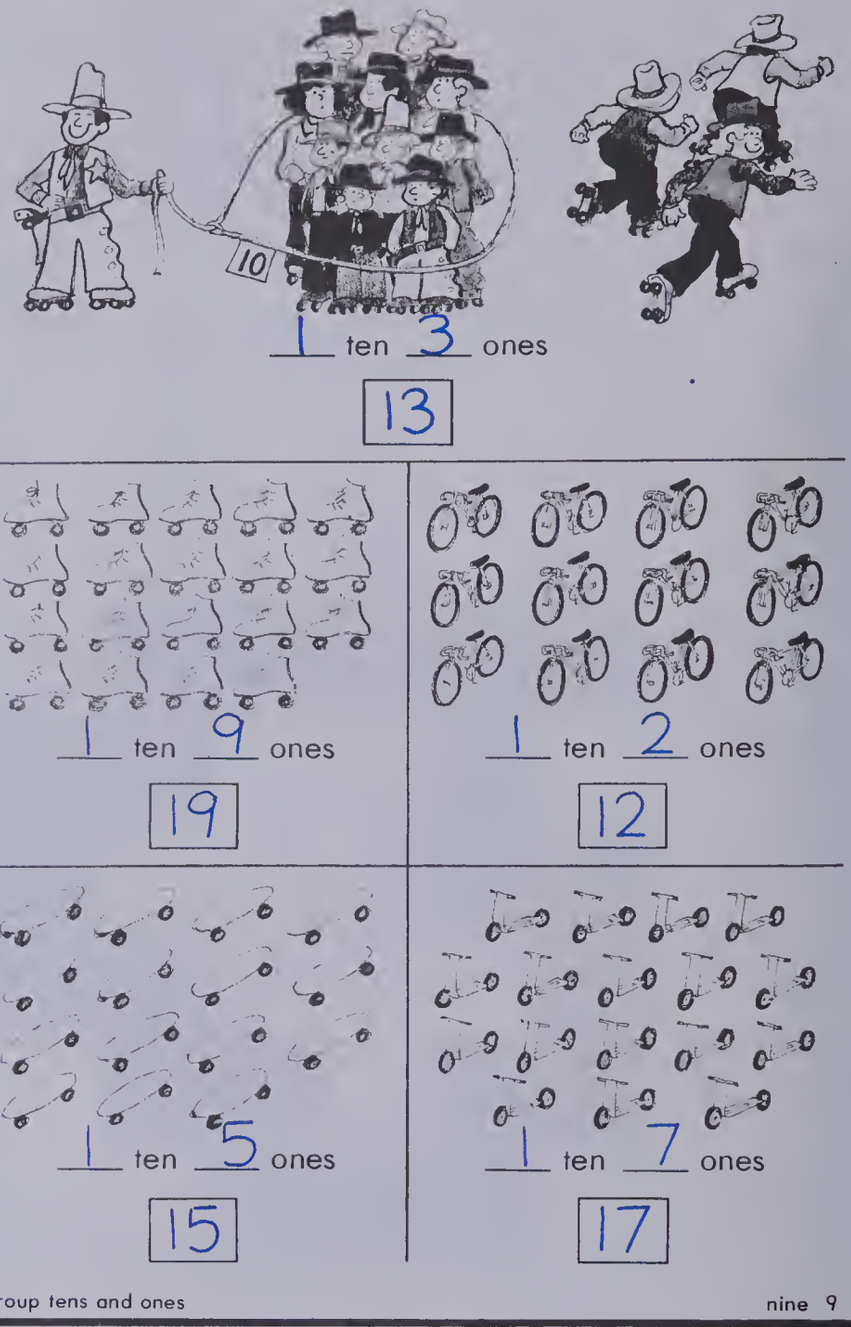
Point out that a set of twenty objects can be grouped into two groups of ten with no ones left over. The numeral representing this grouping has 2 in the **tens place** and 0 in the **ones place.**

Ask the students several questions similar to the following. Have them write their answers on the chalkboard.

"What number has 1 ten and 6 ones?"
"What number has 9 ones and 1 ten?"

Write 10, 13, 18, and 20 on the chalkboard. Ask:

"Which has eight in the ones place?"
"Which has two in the tens place?"
"Which numbers have no ones?"



Using the Pages

- For the exercises on page 9 encourage the students to circle a group of ten before recording their answers. Do the example at the top of the page orally.
- Most of the examples on page 10 require recording the number of tens and ones pictured. The students must recognize the *tens place* and the *ones place* in numerals.

How many tens and ones?

13 ⇨ 1 ten 3 ones

17 ⇨ 1 ten 7 ones

20 ⇨ 2 tens 0 ones

15 ⇦ 1 ten 5 ones

19 ⇦ 1 ten 9 ones

20 ⇦ 2 tens 0 ones

1 ten 2 ones

1 ten	1 ten	1 ten
3 ones	9 ones	6 ones
13	19	16

1 ten 4 ones

How many?

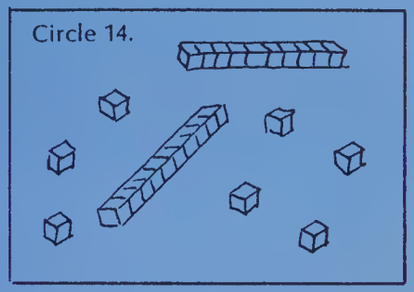
10 14	10 11
10 16	10 10 20

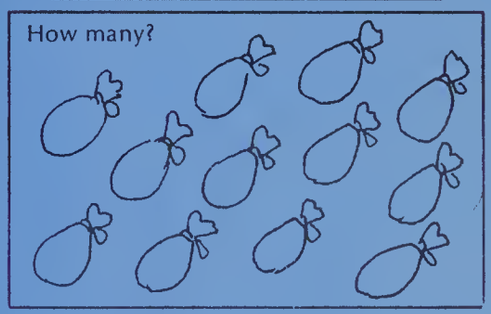
10 ten

Group tens and ones

Reinforcement

1. Prepare plastic covered work cards designed to practise counting and grouping by tens and ones for sets of 10 through 20 objects. Use pictures of place value blocks or of playthings cut from old catalogs.





2. Arrange objects for place value practice. Use interesting set holders for the groups of ten (baskets, flower pots, elastics, coat hangers, toy boats). Also choose set holders that arise from other subjects (from stories, from science experiments).



12 flowers

Enrichment

Have the students investigate grouping sets of objects larger than 20 by tens and ones. Place various amounts of counters (beans, plastic sticks, or bingo chips) in plastic containers. Have the students group the counters into tens and record the amount of tens and ones as well as the number for each.

Extra Practice **Worksheet N5**
Pages 9-10

How many?

1 tens 7 ones 17	1 tens 3 ones 13	1 tens 9 ones 19
1 ten 6 ones ⇨ 16	1 ten 4 ones ⇨ 14	2 tens 0 ones ⇨ 20

How many tens and ones?

15 ⇨ 1 ten 5 ones

10 ⇨ 1 ten 0 ones

12 ⇨ 1 ten 2 ones

9 ⇨ 0 tens 9 ones

UNIT 1 LESSON 6

Objective N6

Determine one more or one less than a given number.

Vocabulary

One more, one less, count down, minus, plus
Direction words: Jump **one more**. Add **one more**. Find **one less**. Count down for blastoff. Make **one less**.

Materials

Floor number line
35 cards, approximately 25 cm × 20 cm (10 *one more* cards, 10 *plus one* cards, 5 *one less* cards, 5 *minus one* cards, 5 *bonus* cards.)

Introducing the Lesson

Introduce the game *One More—One Less Bailout*.

Rules: Choose two players and a caller. Both players start on 5 of the floor number line and must go to 20. The caller draws a card for Player 1 and calls it out. Player 1 follows the instruction, hopping forward or back one. If a mistake is made, the player moves back two spaces. If the card is a *bonus* card, Player 1 gets two more cards. Play alternates until someone reaches the final number and *bails out*.

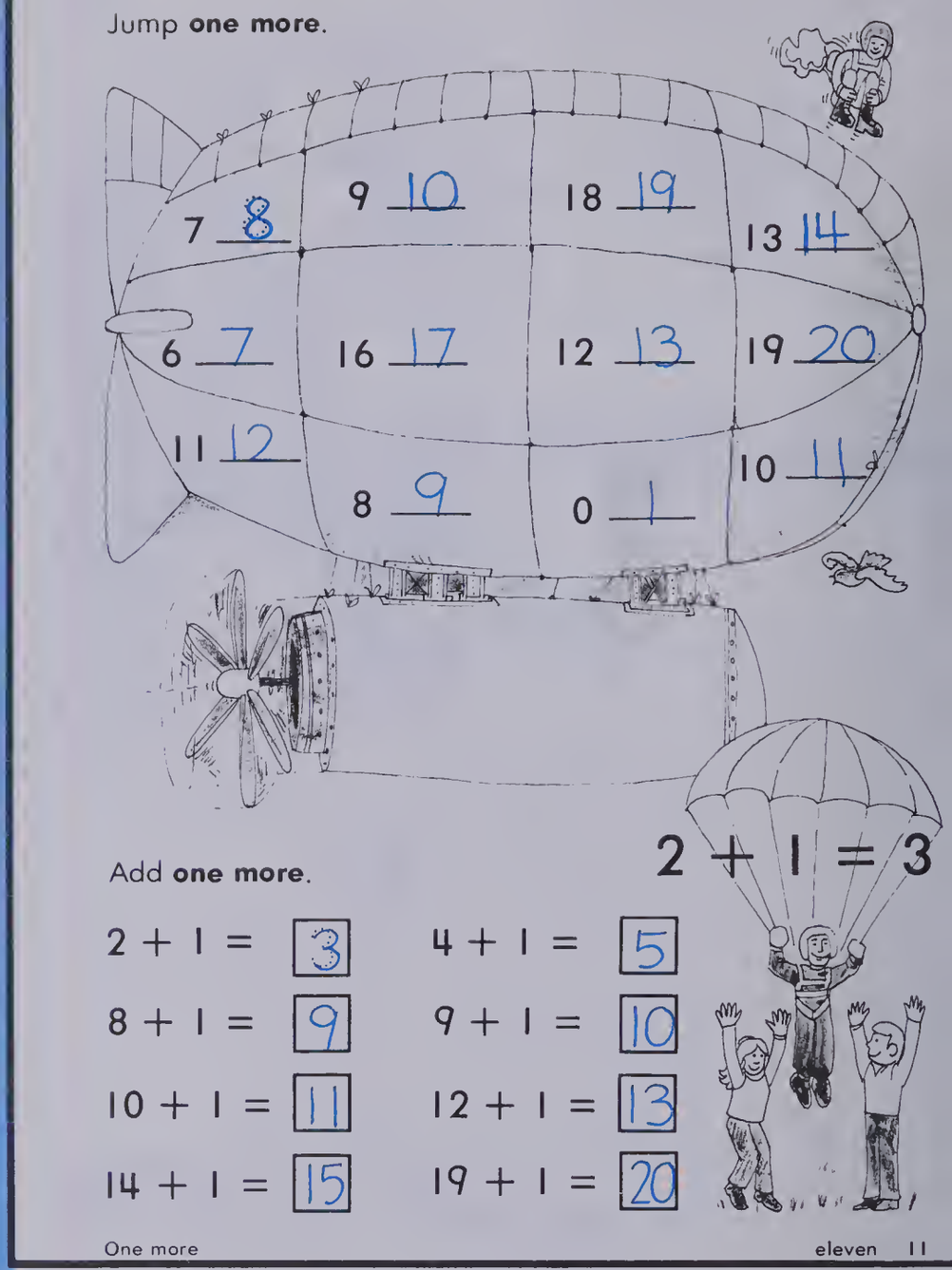
Switch players so everyone has a turn.

Teaching the Lesson

Review at the chalkboard the correct interpretations of **one more**, **minus one**, **one less**, and **plus one**. Ask the children to write number sentences as they respond.

14 → "Add one more." → 14 + 1 = 15
17 → "What is one less than 17?" → 17 – 1 = 16
11 → "What is 11 plus one?" → 11 + 1 = 12
15 → "What is 15 minus one?" → 15 – 1 = 14

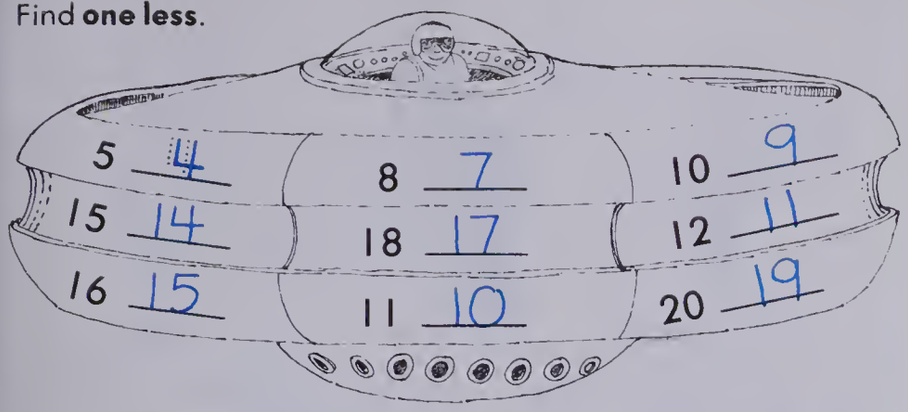
Have someone explain what a *count down* is. Ask the children to count back (as in a count down) by ones from 20, 15, 12, 10, etc.



Using the Pages

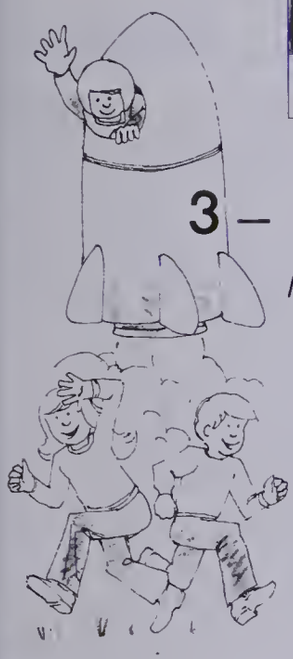
- Point out the illustrations on pages 11 and 12 and discuss the similarities and differences. Draw attention to the illustrations for 2 + 1 = 3 and 3 – 1 = 2.
- Check that the printed directions on pages 11 and 12 are understood.

Find **one less**.



Count down for blastoff.

	11	10	13	12	7	6	5	1
	20	13	12	11	8	4	4	3
	7	14	18	10	9	2	2	2
19	16	15	17	8	19	1	1	1



$3 - 1 = 2$

Make **one less**.

$3 - 1 =$	2	$5 - 1 =$	4
$9 - 1 =$	8	$10 - 1 =$	9
$11 - 1 =$	10	$14 - 1 =$	13
$19 - 1 =$	18	$20 - 1 =$	19

Extra Practice **Worksheet N6**
Pages 11-12

Add one more.

$8 + 1 =$ 9 $5 + 1 =$ 6 $16 + 1 =$ 17 $11 + 1 =$ 12

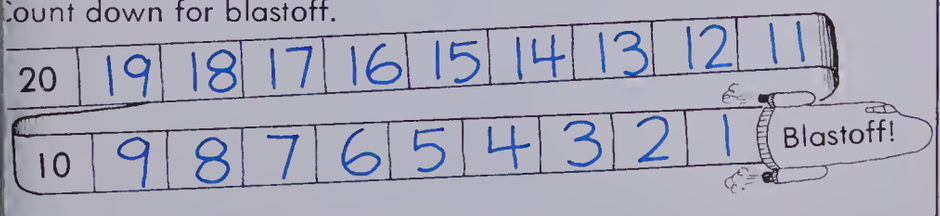
$15 + 1 =$ 16 $18 + 1 =$ 19 $3 + 1 =$ 4 $12 + 1 =$ 13

Find one less.

$7 - 1 =$ 6 $13 - 1 =$ 12 $20 - 1 =$ 19 $1 - 1 =$ 0

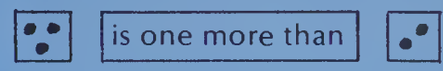
$12 - 1 =$ 11 $17 - 1 =$ 16 $10 - 1 =$ 9 $19 - 1 =$ 18

Count down for blastoff.



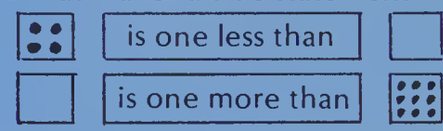
Reinforcement

1. Prepare cards with *is one more than* and *is one less than*. Have the students use these with the Picture Set Cards (to sets of 20) to build meaningful number statements.

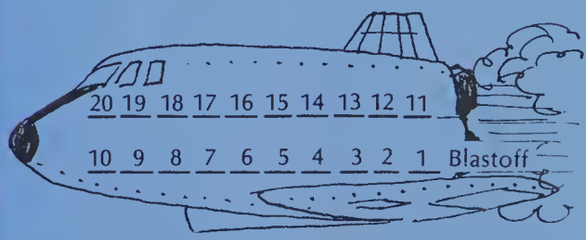


Ask the students to record each number statement they make.

2. Have the students work in pairs. One student makes an incomplete statement using some of the above cards and a blank card. The other student replaces the blank card with the card that makes a true statement.

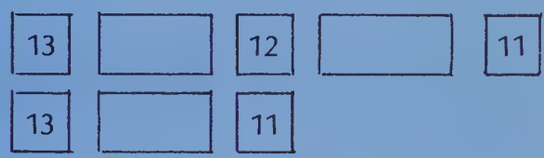


3. Encourage the students to "launch" rockets by counting down from 20. Display these on a bulletin board.



Enrichment

1. Have the students decide what needs to be printed on the blank card so that the following are true statements. Try several similar examples.



2. Let the students count back by ones from 30, 60, or 100 on a long strip of paper.

100
99
98

UNIT 1 LESSON 7

Objective N7

Identify which number is less or greater.

Vocabulary

Greater, greatest, less, least, in order
Direction words: Which is **less**? **least**?
Which is **greater greatest**?
Group by tens.

Materials

Wall number line
Counters: bingo chips*
Numeral Cards 0 to 20

Introducing the Lesson

Review place value.
Remind the students how to group ten ones together and count the remaining squares. Discuss this example and have students help complete other examples.

____ ten ____ ones _____

Teaching the Lesson

Day 1:
Write 1 and 4 on the chalkboard. Using bingo chips, explain that 1 is **less** than 4. Locate 1 and 4 on the number line and note their positions. Now write 11 and 14 on the chalkboard. Locate 11 and 14 on the number line. Discuss their relative positions to determine which is less.

Select two Numeral Cards. Ask which number is less. Place the number by the number line to check. Repeat several times. Discuss that for any *two* different numbers, one number is less.

Draw three Numeral Cards. Explain that *less* can be used for only two numbers. Write **least** on the chalkboard on the left side of **less**. Place the three cards beside the number line and discuss which is least. Repeat using four and five cards.

Play "Cards in Order" (Reinforcement 1).

Day 2:
On the second day, repeat the lesson above for **greater** and **greatest**.

With the number line, Numeral Cards, and bingo chips explain the meaning of **greater** and **greatest** using the same procedure as for **less** and **least**.

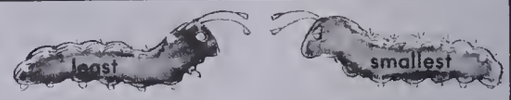


Which is **less**?



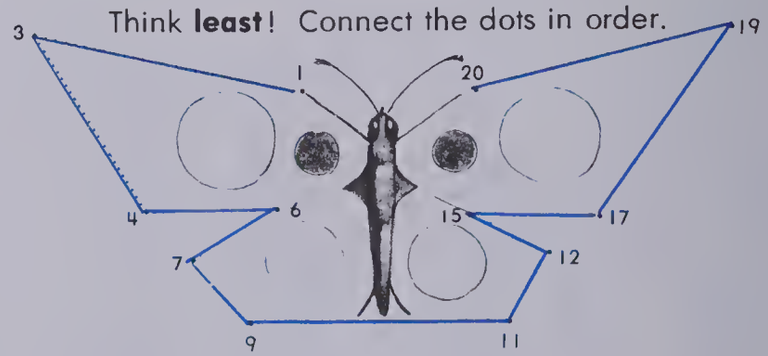
6	(5)	(9)	10	12	(10)	(18)	20
(15)	16	12	(9)	(10)	15	11	(8)

Which is **least**?



13	(10)	19	13	20	15	(9)	6	7	4	9	(3)
9	13	(7)	12	(11)	17	15	13	20	19	(12)	14

Think **least**! Connect the dots in order.



Less

thirteen 13

Using the Pages

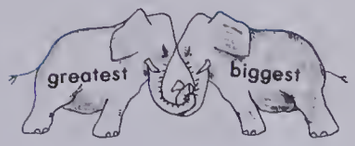
- Discuss the illustration on page 13. Check for understanding of the printed directions, especially those for the dot-to-dot puzzle at the bottom of the page. Assign page 13 on the first day of the lesson.
- Discuss *greater, bigger, greatest,* and *biggest* as you point out the illustrations on page 14. Assign page 14 on the second day of the lesson.

Which is **greater**?



(10)	9	9	(12)	(20)	17	3	(11)
15	(17)	13	(17)	(20)	19	(13)	11

Which is **greatest**?



13	10	(19)	13	(20)	15	9	6	7	4	(9)	3
9	(13)	7	12	11	(17)	5	13	(20)	19	12	14

Back for more! Group by tens.



1 ten 8 ones

18



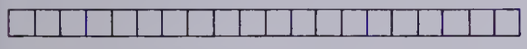
1 ten 6 ones

16



1 ten 4 ones

14



2 tens 0 ones

20

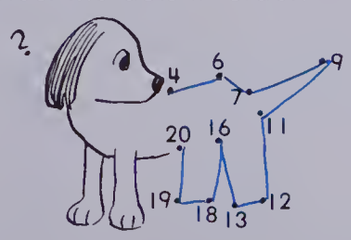
Extra Practice **Worksheet N7**

Pages 13-14

Circle the **least**. Box the **greatest**.

13	(11)	12		16	18	(13)		(6)	9	7	
19	(16)	18	20	9	13	11	12	4	9	7	6
15	14	17	(13)	1	3	0	2	8	(4)	10	9

Think **least**! Connect the dots in order.



Reinforcement

1. Introduce the game "Cards in Order". Adapt the game for individual or group play, if you wish.

Rules: Mix the 21-Numeral Cards (0 to 20). Two players each draw five cards face down. Saying together "cards in order," each turns the cards over and puts them in order horizontally. The solutions are checked against a number line. The winner is the first one finished with the correct answer. The winner deals the next hand increasing the number in each hand by one card.

2. Using the Comparison Cards (less , least , greater , greatest) and the Picture Set Cards to 20, have the students compare sets.

Encourage the students to devise their own activities or games with the cards.

Enrichment

Use these words for the following variety of vocabulary activities.

fewest — fewer — more — most

less

least — lesser — greater — greatest

smallest — smaller — larger — largest

bigger — biggest

1. Discuss the closely related words in the vertical columns.

2. Put these words on cards and let the students sort them into like groups.

3. Ask the students to illustrate the words. Discuss the pictures.

4. Determine how the meanings and usages of the words are different and similar by completing and discussing the following phrases with as many comparison words in each blank as appropriate:

in _____ cars

with the _____ number of cars

the _____ number I have _____

the _____ horse I have _____ rocks.

UNIT 1 LESSON 8

Objective M1

Write amounts of money to 20¢ and exchange dimes and pennies.

Vocabulary

Money, penny, dime, trade
Direction words: How much money?
Make a **trade**.

Materials

Pennies and dimes

Introducing the Lesson

Pass around several pennies and dimes. Discuss their values and their distinguishing characteristics. List these under the column headings *Penny* and *Dime* on the chalkboard.

Penny	*Dime*
1¢	10¢
copper colour	silver colour
maple leaf picture	sailboat picture
one cent	ten cents

Teaching the Lesson

Practise finding the values of sets of coins by two methods:

1. *Counting on from 10*
1 dime, 3 pennies
Ten — eleven, twelve, thirteen.

2. *Place value*
1 dime and 9 pennies = 19¢

Print **trade** on the left side of the chalkboard. Explain that a trade is an exchange of things: one group of things *for* another group of things. Write the following on the board:

trade ☐ for ☐

Elicit from the students examples of trades: trade (my watch) for (your shoe). Discuss the concept of a *fair* or *even* trade versus an uneven trade. Draw a dime and 20 pennies.

Trade [10¢] for [20 pennies]

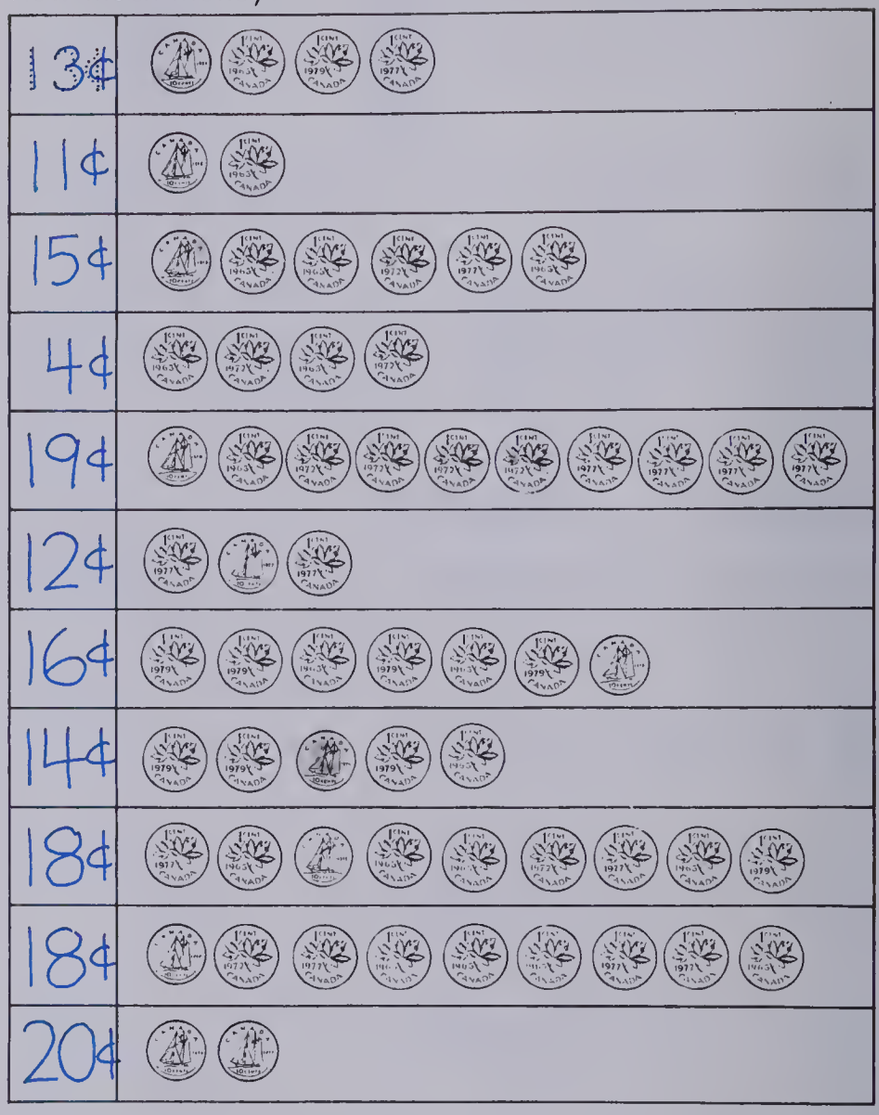
Ask if the trade shown would be fair. Have a student circle ten pennies to show a *fair* trade. Emphasize that ten pennies are worth the same as a dime.

Repeat the demonstration with a variety of price tags and coins.


10¢ **dime**


1¢ **penny**

How much money?

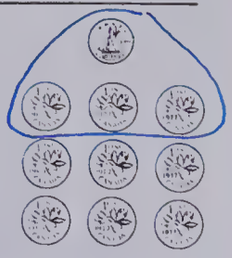


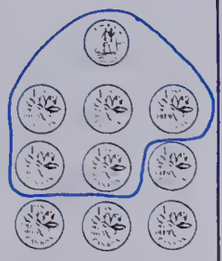
Using the Pages

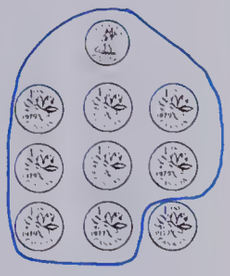
- See that the amounts of money on page 15 are written with a ¢ sign. Note that the dime is not always at the left of the row of coins.
- For some of the trades on page 16, more coins than needed are pictured.

Make a **trade**.

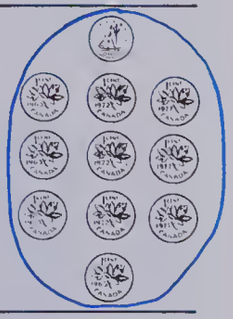
Trade 10¢ for 

Trade 13¢ for 

Trade 15¢ for 

Trade 18¢ for 

Trade 20¢ for 

Trade 20¢ for 

Trade 2 dimes for 20 pennies

Trade  for 20 

Extra Practice

Worksheet N8
Pages 15-16

Make them equal.

18¢ = 1 dime 8 pennies 13¢ = 1 dime 3 pennies

20¢ = 2 dimes 0 pennies 11¢ = 1 dime 1 penny

4 pennies, 1 dime — 14¢

0 pennies, 2 dimes — 20¢

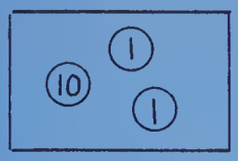
12¢ + 1¢ = 13¢ 15¢ + 1¢ = 16¢

9¢ + 1¢ = 10¢ 17¢ + 1¢ = 18¢

13¢ + 1¢ = 14¢ 19¢ + 1¢ = 20¢

Reinforcement

1. Attach dimes and pennies to cards and have the students practise writing or drawing the amounts.

front: 

back: 12¢

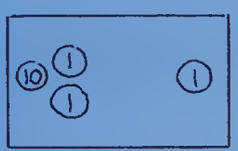
2. Set out 6 small jars filled with one dime and ten pennies. Have extra coins available and ask the students to trade these amounts:
11¢, 18¢, 20¢, 13¢, 16¢, 19¢
For example: 11¢ = 1 dime + 1 penny
(9 pennies would not be used.)

Enrichment

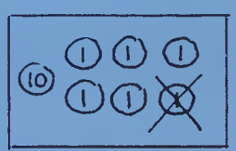
1. Have the students research in the local stores what can be bought with amounts of 5¢ to 20¢. Make a display of the findings.

15¢  or  or 

2. Ask the students to draw a dime and some pennies on a card, showing how 1¢ was either added to or subtracted from that amount. Display these so that the other students can write number sentences for them.



12¢ + 1¢ = 13¢



16¢ – 1¢ = 15¢

UNIT 1 LESSON 9

Objective GR1

Read and construct bar graphs.

Vocabulary

Bar graph, counting on
Direction words: Colour the bar graph.
Who got **less**? How high?

Materials

Chart graph paper
Crayons

Introducing the Lesson

At the chalkboard, review the two ways of determining how many squares are in the following examples.



First, count on from 10 (..., 11, 12, 13). Then recall the place value method (1 ten 3 ones is 13).

Teaching the Lesson

Make a list of favourite recess games. Determine the three most popular. Then have the children vote for their favourite from the three chosen. Tally the votes. Explain that sometimes it is useful to show number information in a picture called a **bar graph**.

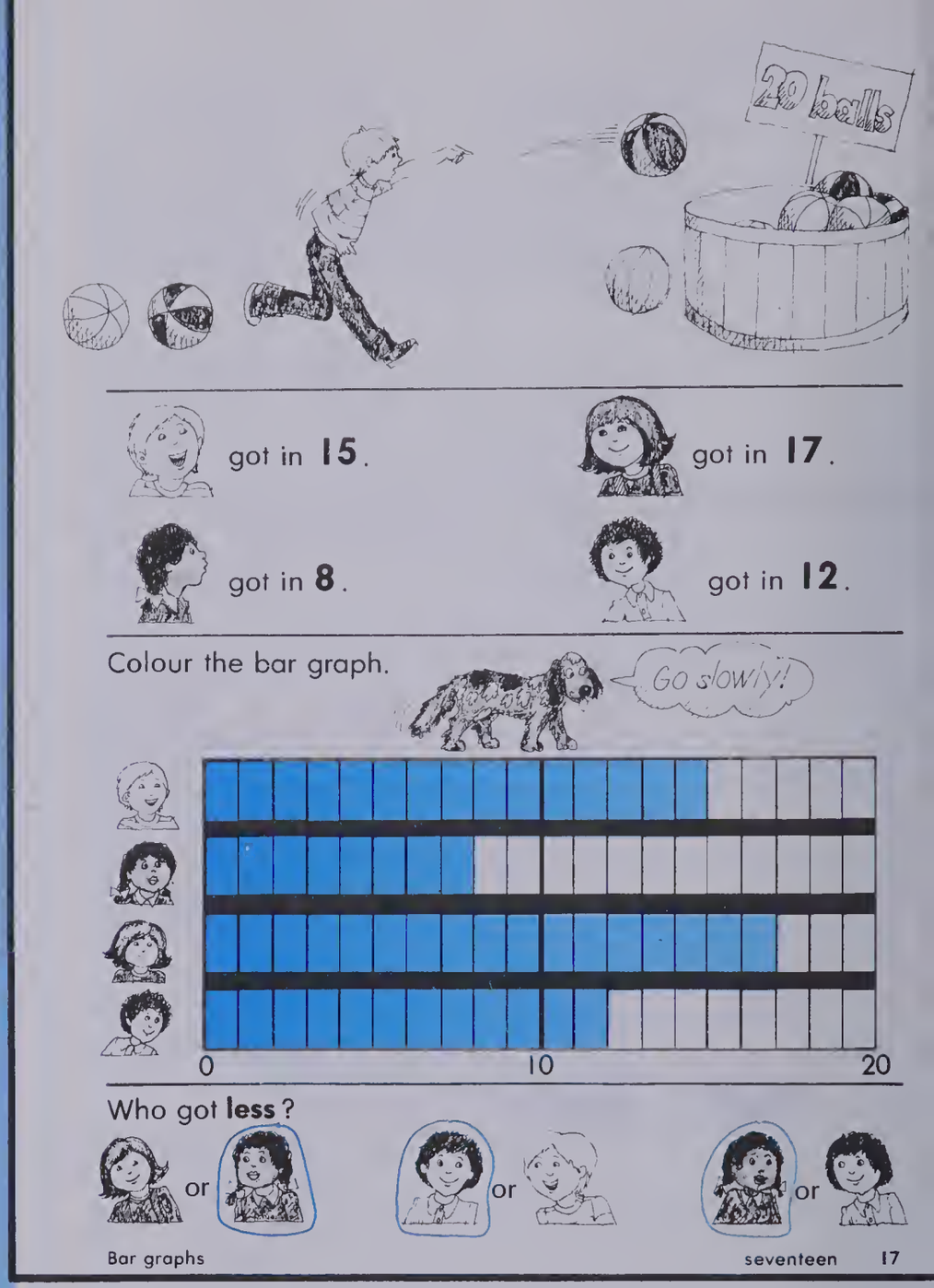
On chart graph paper, list the three games chosen on the vertical axis. Explain that when a square is coloured beside a game, it means that someone chose it. Carefully fill out the bar graph according to the voting.

Explain that the other axis has to be named also. Discuss the meaning of each bar and decide upon a name for the horizontal axis (Number of Votes).

Discuss how the graph makes it easy to see which game is most popular.

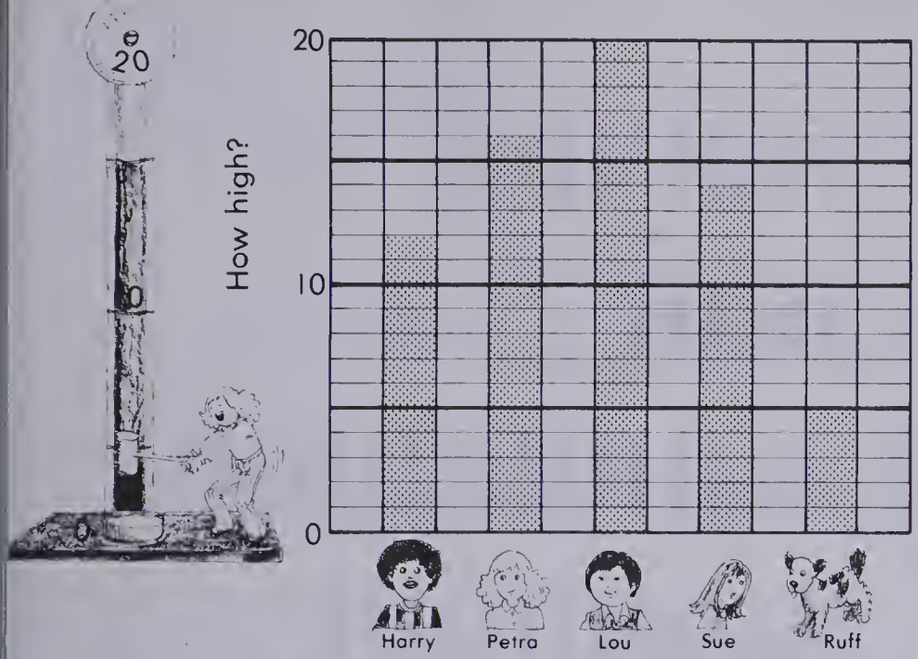
Tilt the bar graph on end and explain how graphs can also be vertical ("up and down"). Reinterpret the meaning of the bars.

Ask questions about the graph involving comparisons. Use the words "less", "least", "greater", "greatest".



Using the Pages

- Once the graph has been coloured in, the students can make the comparisons required at the bottom of the page. Relate the finding of the length of the two longest bars to previous number work, that is, use the 10 vertical line for counting on from 10 and for applying the place value method.
- Explain that on page 18 the graph is already made. Some comparing and ordering must be done at the bottom of the page.



How high?	1 ten 2 ones Harry 12	1 ten 6 ones Petra 16
2 tens 0 ones Lou 20	1 ten 4 ones Sue 14	0 ten 5 ones Ruff 5

Who got the **least**? or or

Who hit the ? Petra or Lou or Sue

Put in order.

Ruff, Harry, Sue, Petra, Lou

Extra Practice **Worksheet GR1**

Pages 17-18

Colour the bar graph.

6 have .

16 have .

3 have .

13 have .



How many ? ____

Reinforcement

Refer to the Graphing Diary for One Year in the Ideas section of the introduction to this unit.

Enrichment

Organize the research activity described below so that it is completed in stages. Prepare simple forms to facilitate each step.

1. Have each student to pose a research question to be asked of his classmates. Check each question to make certain that it is appropriate to the graphing task (no more than five or six responses possible). Examples of questions are: "What is your favourite sport?" "What kind of vegetable do you like most?" "Would you rather be a letter carrier, police officer, or firefighter?" Ensure that each question is different.

2. Let the students gather data. Provide class lists with space for answers beside each name. Allow enough time for each child to interview the whole class.

3. Ask each student to summarize the data in numerical form (4 letter carriers, 12 police officers, 13 firefighters).

4. Ask each student to summarize the data on a bar graph. Provide an outline on graph paper to make this task easier. Discuss how to label the axes. Have the original question that was posed appear somewhere on the graph.

5. Ask the students for several interpretation questions about the information on their graphs. Discuss at length the kinds of questions that can be used. Post the graphs and questions around the room.

6. As a final step, let the students draw several names from a hat. Ask each student to answer the interpretation questions chosen. Pin up the answers beside the graphs and questions for a classroom display.

Problem Solving Activities

Assign Level 2, Unit 1

UNIT 1 LESSON 10

Objective GR2

Relate picture graphs and bar graphs.

Vocabulary

Picture graph, bar graph
Direction words:
Number of trees climbed.
How many trees were climbed?

Materials

Rulers

Introducing the Lesson

Draw two rows of trees on the chalkboard. The trees within each row can vary in size.

Leo

Sue

Count the trees. Discuss experiences the students have had climbing trees. Relate the discussion to the size of the pictured trees.

Teaching the Lesson

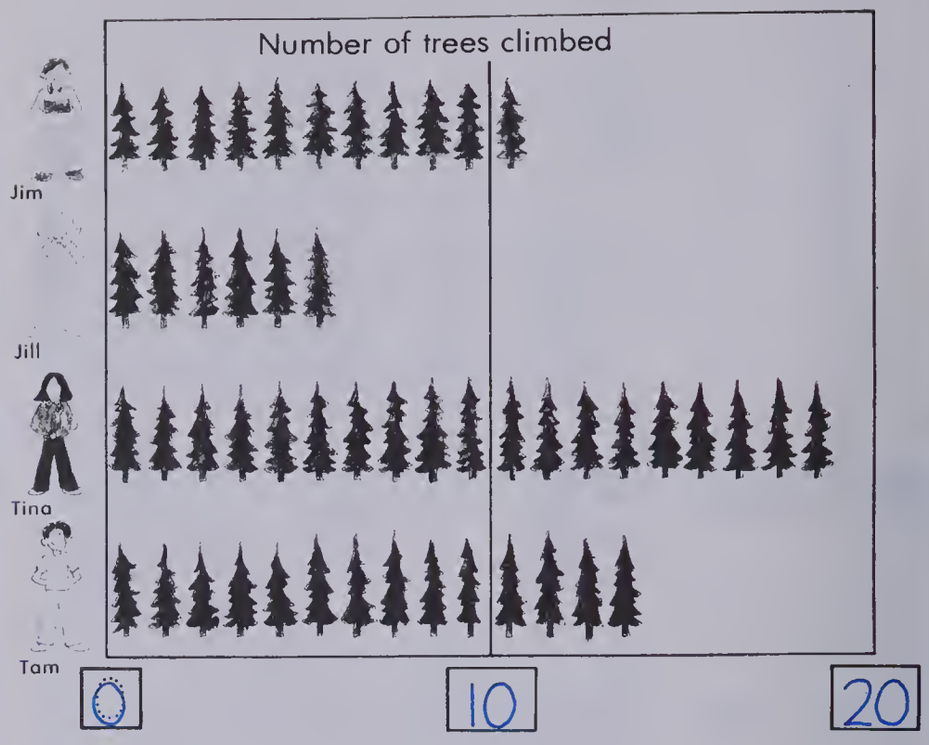
Have the students turn to page 19. Ask for an explanation of the graph. Read the title together. Identify the four children. Determine how many trees Jim has climbed.

Return to the chalkboard tree graph. Discuss how many trees Leo and Sue climbed. Ask who climbed more.

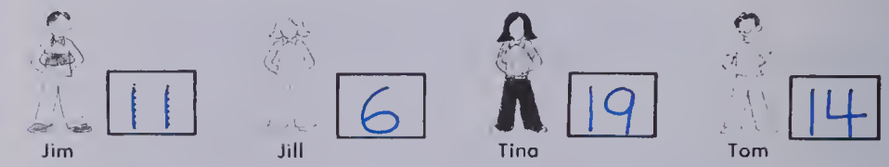
Establish that having different sizes of trees is acceptable. Discuss reasons why it may be useful to draw trees the same size (easier to compare numbers, able to include helpful number indicators). Relate this discussion to the graph in the workbook.

Reinforcement

Pick a topic for graphing from your social studies or science program. Together make a vertical picture graph in which the pictures are the same size. Show the children how to convert this graph to a bar graph by drawing bars around the pictures.



How many trees were climbed?



Who climbed **more**?



Who climbed the **most**? Jim Jill (Tina) Tom

Who climbed the **least**? Jim (Jill) Tina Tom

Using the Page

- Fill out together the number indicators along the bottom axis (0, 10, 20). Explain that 10 is a special number, but that other numbers can be added along the bottom. Discuss why 5 and 15 are reasonable choices (cut each section in half).
- Ask the students to draw lines with their rulers for 5 and 15 and to print the numbers on the bottom axis. Practise counting on by ones from 5, 10, and 15. Use this strategy to complete the first exercise.
- Review the meanings of "more", "most", "least". Associate "greater" with "more" and "greatest" with "most". Finish the page as a group.

Count to 20.

10 11 12 13 14 15 16 17 18 19 20

Find one more.

7 8 12 13 19 20

Find one less.

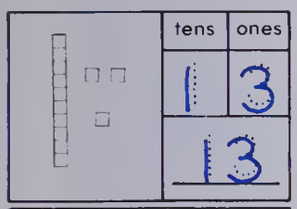
9 8	14 13	20 19

Which is least?

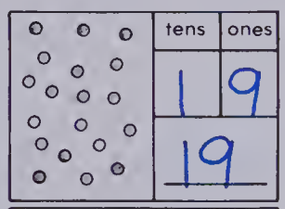
3 6 (2) 5	12 10 (9) 13	17 20 16 (14)

Which is greatest?

3 (6) 2 5	12 10 9 (13)	17 (20) 16 14



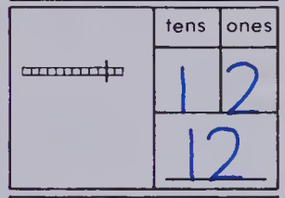
tens	ones
1	3
13	



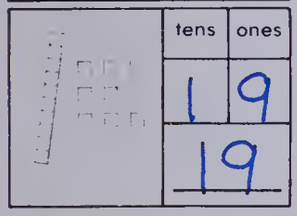
tens	ones
1	9
19	



tens	ones
1	5
15	



tens	ones
1	2
12	

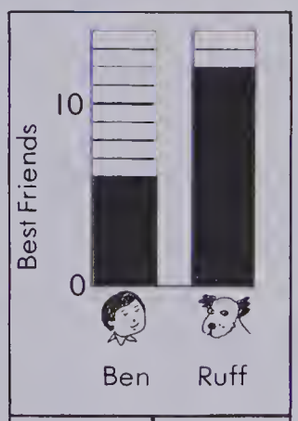


tens	ones
1	9
19	



How much?

19¢



Ben has	Ruff has
6	12

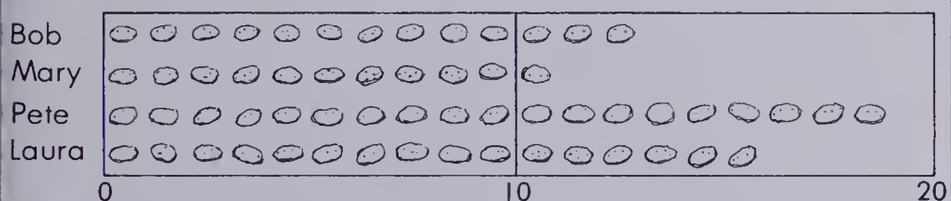
Who has more?

Ruff

Extra Practice **Worksheet GR2**

Page 19

Number of cookies eaten



How many cookies were eaten?

Bob 13 Mary 11 Pete 19 Laura 16

Who ate more? Mary or (Laura)? (Pete) or Bob?

Who ate the most? Bob Mary (Pete) Laura

Who ate the least? Bob (Mary) Pete Laura

UNIT 1 TEST

Part 1: Counting to 20.

Part 2: Finding one more and one less.

Part 3: Finding the greatest and least number.

Part 4: Place value, counting on, and graphing.

UNIT 2
Addition and Subtraction Facts to 9

Theme: Hobbies

Lesson		Objective	Pages
1	A1	Add to sums of 4 and 5.	21-22
2	A2	Add to sums of 6 and 7.	23-24
3	A3	Add to sums of 8.	25-26
4	A4	Add to sums of 9.	27-28
5	PS1	Interpret and solve addition picture and word problems.	29-30
6	A5	Subtract from 4 and 5.	31-32
7	A6	Subtract from 6 and 7.	33-34
8	A7	Subtract from 8.	35-36
9	A8	Subtract from 9.	37-38
10	PS2	Interpret and solve subtraction picture and word problems.	39-40
11	A9	Add or subtract related sentences.	41-42
12	PS3	Add or subtract to solve picture problems.	43
Test		Addition and subtraction facts to 9	44

Vocabulary

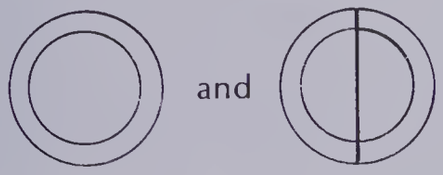
add
plus
equals
number sentence
down
across
addition names
addition sentence
count on
addend
sum
add on
change order
penny
nickel
dime
quarter
heads
tails
related facts
opposites
more
in all
altogether
join
subtract
take away
minus
subtraction names
subtraction sentence
separate
starting set
go back
compare
less
difference
related sentences
whole
part
give back

Printed Directions:

Add on to make 8 fish in each bowl.
Colour to show names for 9.
Print the addition number sentence.
Cross out to subtract.
Put 9 bottle caps in each box.
Can you help Bozo find the missing number?

Materials

Addition Name Cards to sums of 9: [6 + 3]
Subtraction Name Cards from minuends to 9: [8 − 2]
Numeral Cards: [0] to [9]
Symbol Cards: [+], [−], [=]
Vertical Addition and Subtraction Fact Cards to 9*
Paper plates with and without a dividing line:



Wall Number Line to 100
Floor Number Line to 10
Counters: beans, buttons, macaroni, bingo chips*, bottle caps

Plasticene	construction paper
popsicle sticks	scissors
interlocking cubes	crayons
wooden blocks	playing cards
pencils	dice
chart paper	stickers
graph paper	pennies*
coins*	feltboard
boxes	felt cutouts
rubber stamps	artificial flowers

*Available in the Houghton Mifflin K-2 Activity Kit.

About This Unit

Unit 2 is designed to review and consolidate the addition and subtraction concepts and skills which were previously introduced in the grade 1 program. The unit deals with addition and subtraction facts to sums of nine. Many students will recall these facts with ease, while others may still need to count or reason with the help of concrete materials, fingers, or visual aids to find sums and differences.

Ideally, by the end of Unit 2, the students will have reviewed the ideas presented in the lessons (addition and subtraction concepts, properties, number sentence formats, and solution methods) and will be able to recall sums and differences for facts to nine.

In fact, however, you probably will have students working in various stages in the following *sequence of development of basic fact recall:*

1. Using counting methods that involve showing both of the addends and then counting up from one addend to the sum, usually with the help of blocks, pictures, fingers, and so on.

 ○○○○○○ ● ● ●

 6 + 3 = □ 6 3

 Six. Seven, eight, nine.

 (For subtraction, this usually involves showing the starting set, counting off one addend, and counting up the remaining addend.)

 6 − 4 = □ ○○○○ Four. ○ ○ One, two.

2. Using more abstract and efficient counting methods, such as counting on or back from a starting set. This involves being able to represent a quantity mentally without actually seeing it and counting from one addend each time. Materials, fingers, or illustrations may be used, but often only an oral or mental count or tally is used with these methods.

 ○ ○ ○

 6 + 3 = □ Six. *Seven, eight, nine.*

 9 − 2 = □ Nine. *Eight, seven.*

3. Using thinking or reasoning methods that involve the use of known facts, groupings, and relationships.

 5 + 4 = □ 4 + 4 = 8, so, 5 + 4 = 9

 9 − 3 = □ 3 + 6 = 9, so, 9 − 3 = 6

4. Recalling sums and differences without the necessity of counting or reasoning. Often "simpler combinations", such as doubles (3 + 3, 4 + 4, etc.), will be handled on a recall level, while more difficult combinations may still be counted or reasoned out.

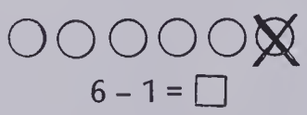
For students who can reason or recall most facts to nine, activities that emphasize speed of response will be most appropriate. The Enrichment activities in each lesson and the Ideas section of the introduction of this unit may be helpful.

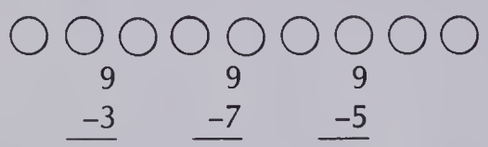
For students who still need to illustrate both addends of an addition combination and count up the total, more experience with concrete models and work with counting on from one addend may be most appropriate. (See the suggestions provided in the Ideas section of the introduction.)

Children who count on from one addend may need encouragement to think in groups instead of counting by ones. They may also benefit from activities that encourage reasoning or that rely on estimating and guessing. Again, see the Ideas section for suggestions.

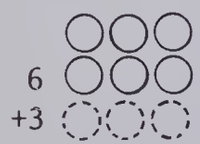
To provide for the wide range of individual differences in performance that may be apparent in your class and to review concepts and skills, a variety of exercise types is provided. Usually, the first exercise in a lesson provides illustrations for counting or partitioning.







Some exercises involve actively adding on or crossing out counters.

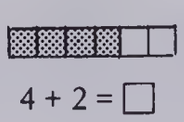




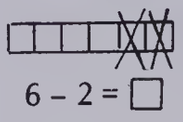
At least one exercise in each lesson provides straightforward addition or subtraction practice without aids. Most lessons also include one "fun" activity involving colouring, matching, or adding on by drawing.

Limited emphasis is placed on using action pictures for joining and separating subsets, due to the difficulties children often have interpreting these pictures, particularly for subtraction.

The non-action interpretations for addition and subtraction are used frequently, particularly for developing the part/-whole ideas necessary for children to grasp the inverse relationship between addition and subtraction.

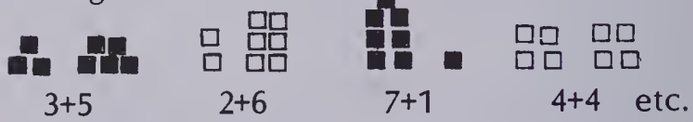


Four red blocks, two green blocks, six blocks in all.



Six blocks in all. Two are green. Four are red.

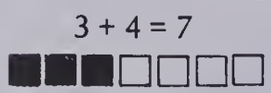
The concept of *names for numbers* (names for 5: 0+5, 1+4, 2+3, 3+2, 4+1, 5+0, 6–1, 7–2, etc.) is used throughout the unit. Lesson activities develop this idea through use of sets of objects, for example, "If we have 8 blocks, how many ways can we arrange them?"

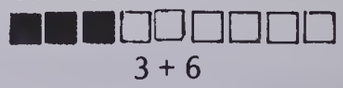


The idea of *names* is used to introduce addition names for 8 and 9, and in later units for sums to 18. It reinforces the concept of the invariance of number and emphasizes the part/whole relationship of addends and sums.

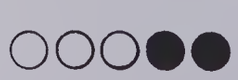
Emphasis is placed on the *translation of addition and subtraction models to mathematical symbols,* both with lesson materials and with illustrations. The students are given opportunities to translate models into symbols, and vice versa.

Colour to show names for 9.





Picture problems such as these are extended to include simple word problems, in which an illustration and/or words are given, and the students are asked to record a number sentence to describe the situation.



three yellow ●
two red ●
How many ● in all?

Three exercises involving missing addends are included to develop intuitive understanding of the *inverse relationship* between addition and subtraction. These exercises require adding on to a starting set to get a particular sum. Illustrations

accompany all examples, and the lessons deal with the language and reasoning required to interpret the examples. The students are encouraged to think, "Three and how many more give me eight in all?" or "Three plus what makes eight?" The abstract subtraction interpretation (eight minus three) is not introduced at this stage. Lessons emphasize the part/-whole relationship of addends and sums, but the completing of pupil pages does not rely on this understanding. (Research indicates that many seven- and eight-year-olds are not developmentally ready to grasp the logic of the inverse relationship between addition and subtraction.) The *commutative property of addition* is taught in lesson activities through oral work and with concrete materials.



3 + 5 = 8 5 + 3 = 8

Counting on from the greater addend also engenders intuitive understanding of the commutative property.

2 + 8 = ☐



"Start with 8 in the bag. Add two more."

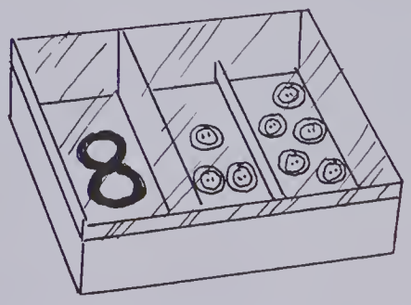
Throughout Unit 2 emphasis is placed on language related to the concepts outlines. Lesson activities are designed to give students a chance to work with concrete materials as they describe the relationships that will later be presented more abstractly. From this concrete oral work, students learn to translate these ideas first at a pictorial level, then at an abstract or symbolic level. All pupil page activities, therefore, are pictorial or symbolic in nature and are intended to follow work at the concrete level. Some of the methods used to develop addition and subtraction concepts, particularly where action (such as joining, separating, adding on, covering up, crossing out, partitioning, etc.) is used, would be meaningless on a two-dimensional pupil page unless the lesson activities have been done and the transition has been developed. For this reason, it is important to employ the lesson activities as a prerequisite to the assignment of the pupil pages.

Ideas

1. Students who require more experience with concrete materials and work at the concept level of addition and subtraction:

Number Boxes

Prepare boxes as shown below for sets of 4, 5, 6, 7, 8, and 9. These can be used by individual students for shaking and recording all possible arrangements for each set.

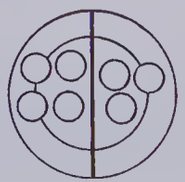


8

3 + 5
6 + 2
4 + 4
0 + 8
5 + 3

Paper Plate Mats

Provide a paper plate for each student. Draw a line on the plate to separate it into two parts. Using counters and a list of open number sentences, have the students show both addends of addition sentences and record the sums. For subtraction, start with the set on one side of the centre line, separate a subset to the other side, and record what is left on the starting side.



4 + 3 = 7



5 – 2= ☐ 5 – 2 = 3

Macaroni Sticks

Provide a variety of types of macaroni, white glue, popsicle sticks, and Addition Name Cards. Ask the students to arrange and glue macaroni on popsicle sticks to match each Addition Name Card. These models can later be used in a matching game with the name cards. Spray-paint the models for variety.



3 + 4 4 + 2

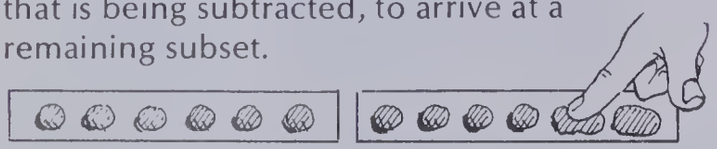
For children who recognize the commutative property of addition, one model can be used for two cards.



5 + 1 1 + 5

Squish

Provide Plasticene, cardboard strips, and Subtraction Name Cards. Students illustrate the starting set (sum) with Plasticene balls or blobs. Then they squish the subset that is being subtracted, to arrive at a remaining subset.



6 – 2 = □ 6 – 2 = 4

Roll and Count

Use two regular dice, counters (beans, buttons, or bingo chips), and paper plates for each of two to six students. Each student takes a turn rolling the dice, takes counters to match the sum, and puts these on his or her plate. After each student has had three turns, the counters are counted. The student with the most counters starts a new game.

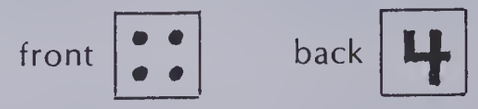
2. For students who need to utilize more efficient counting strategies, such as counting on:

Paper Plate Piles

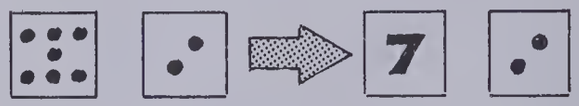
Use addition open sentence cards (4+2=□), counters, and two paper plates. Give each student a chance to choose a card, illustrate both addends, cover the greater addend, and count on from the other addend to find the sum.

Counting on

Prepare Dot Pattern Cards with matching numerals on the back, as shown below:



Place the cards, pattern side up, on a table. Say an addition name, such as 2+7. Have a student find the Dot Pattern Cards for 2 and 7. Turn over one card, preferably the larger set. Ask the student to count on from that number to determine the sum. Repeat with other addition names and other students.



Seven. *Eight, nine.*

Add On, Cross Off

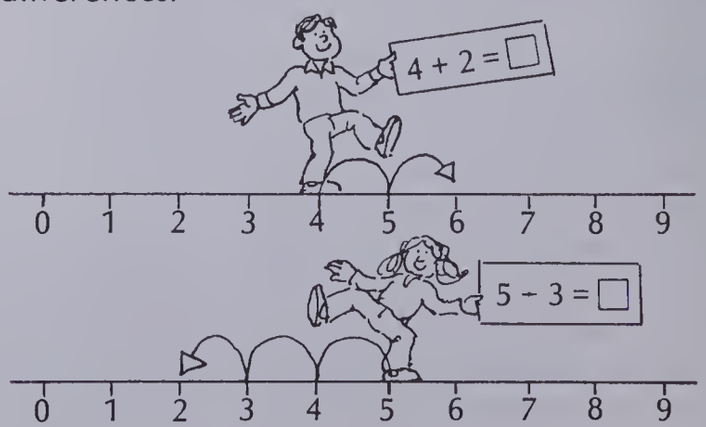
Distribute worksheets or acetate-covered cards with open addition or subtraction sentences. For addition, students provide a model (on the worksheet or card) of the starting set (or the greater set) and room for adding on the other set. For subtraction, students are to cross off the subset to be subtracted, and record the remaining subset.



7 + 2 = □ 8 – 4 = □

Count On or Back

Use a floor number line and mixed open addition and subtraction sentence cards. Students choose cards, start on the number line and add on or go back according to the number to be added or subtracted. Have them record sums and differences.



3. For students who count on quickly or who reason without counting sums and differences and who, therefore, are ready to work for speed or recall:

Take a Chance

Use *doubles* Addition Name Cards (2+2, 3+3) and *zero*, *one*, and *two* Addition Name Cards (5+0, 6+1) to play a guessing game where no counting is allowed and taking a chance is encouraged. There is no penalty for wrong guesses. The purpose of the game is to illustrate that memory can replace counting. Play begins by flashing a card. Students are to say the sum immediately. Read the card aloud with the correct sum. Have the children who said the correct sum raise their hands for quick recognition. Then flash another card.

Number Bingo

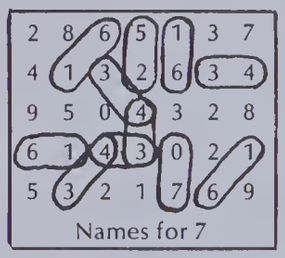
Provide bingo cards covered with the numerals from 0 to 9. These can be made by the students if you prepare open 5 × 5 grids on cards. The cards can be used in several ways:

a. Show addition fact cards as students cover the sums with chips.
b. Show subtraction fact cards; students cover the differences.
c. Call mixed addition and subtraction examples.
d. Give a number, e.g., 5. Have the students choose a name for 5 and cover two spaces, e.g., 2 and 3, 4 and 1, or even 6 and 1 (6 – 1). Have each name given orally to check responses (and to illustrate the variety of names that can be found). Vary the rules for who wins. Some suggestions are: one row any direction; one horizontal row; two vertical rows; both diagonals; whole card, etc.

Number Grids

Prepare a worksheet of several number grids of varying sizes. Cut the sheets to separate each grid. Use one grid at a time. These grids can be used in many ways. Here are some basic fact uses:

a. Find and circle 2 numbers that add to a particular sum. Number pairs must be horizontally, vertically, or diagonally adjacent. Provide a time limit. The person with the most correct pairs wins.



Names for 7

b. Find, label, and circle addition or subtraction sentences. Use only horizontal and vertical directions. Show the children how to put in the plus (or minus) sign and the equals sign.

2	+	6	=	8	4	1	3
1	4	7	2	3	5		
5	6	4	2	1	0		
6	3	3	9	6	2		

c. Find horizontal pairs that add to 7. Circle them with red. Find vertical pairs that add to 8. Circle them with blue. Find diagonal pairs that add to 9. Circle them with yellow.
d. Find three neighbouring numbers that add to 9.
e. Loop pairs of numbers that have a difference of two.

Timed Drill Sheets

Prepare a drill sheet of four columns of addition facts:

a. Column A: Add zero, one, or two to sums of nine.
b. Column B: Add to sums of nine without zero and one.
c. Column C: Subtract zero, one, or two from numbers to nine.
d. Column D: Subtract from numbers to nine without zero and one.

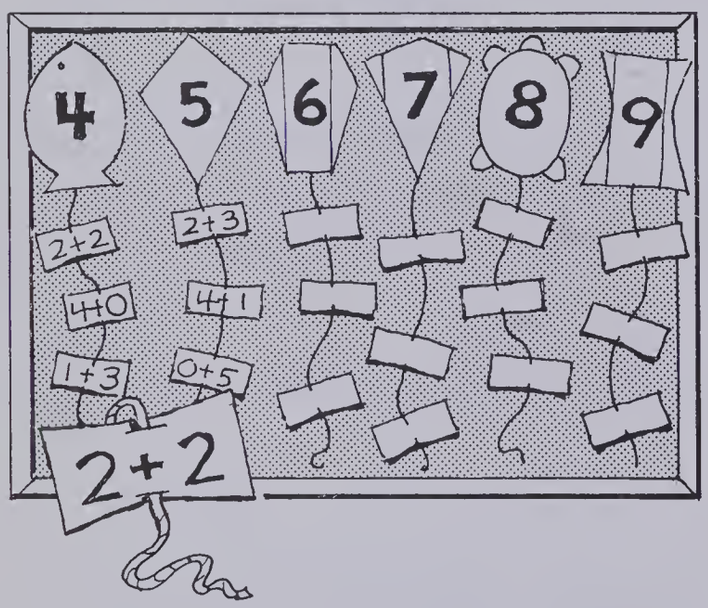
Cut the drill sheet into four strips. Set a time goal and have the students find the sums or differences using one strip at a time. Show them how to record their results on a chart. Do each strip on several different occasions to note the individual progress.

Graphing

Several lessons in this unit include graphing ideas in the Enrichment section. In Unit 1 the students had experience with simple bar graphs and picture graphs. Check the Ideas section of the introduction to Unit 1 for continuing the ongoing graph-of-the-week program.

Bulletin Board Game

Display six colourful paper kites labelled 4 to 9. Secure a piece of thick string to the bulletin board, at the bottom of each kite. Provide a box with a set of Addition Name Cards for 4 to 9. Make a 2 cm slit at the top and bottom of each card, so that it can be hung on the string tail of the appropriate kite.



Name _____

Pretest **Unit 2**

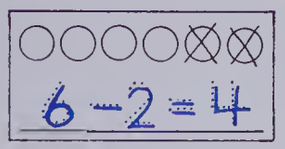
Add.

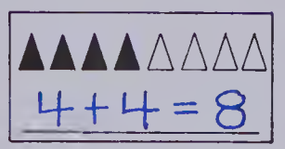
6 + 2 = 8	5 + 1 = 6	3 + 4 = 7	8 + 0 = 8	3 + 3 = 6	2 + 5 = 7
3 + 6 = 9	6 + 2 = 8	4 + 5 = 9	4 + 4 = 8	7 + 2 = 9	5 + 3 = 8

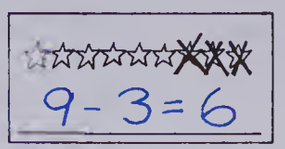
Subtract.

9 − 7 = 2	8 − 2 = 6	5 − 4 = 1	1 − 1 = 0	7 − 5 = 2	9 − 3 = 6
8 − 4 = 4	7 − 4 = 3	9 − 5 = 4	6 − 2 = 4	9 − 2 = 7	5 − 4 = 1

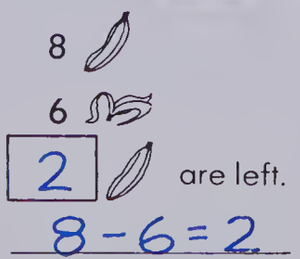
Print a number sentence for each picture.











Name _____

Post-test **Unit 2**

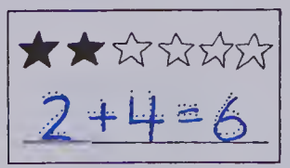
Add.

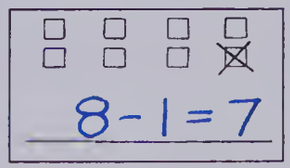
2 + 3 = 5	6 + 2 = 8	1 + 7 = 8	4 + 4 = 8	3 + 4 = 7	8 + 0 = 8
2 + 5 = 7	3 + 3 = 6	3 + 6 = 9	5 + 4 = 9	2 + 2 = 4	7 + 2 = 9

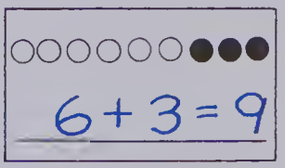
Subtract.

9 − 2 = 7	8 − 3 = 5	5 − 2 = 3	7 − 3 = 4	9 − 1 = 8	8 − 4 = 4
7 − 2 = 5	8 − 2 = 6	6 − 5 = 1	9 − 4 = 5	7 − 6 = 1	9 − 3 = 6

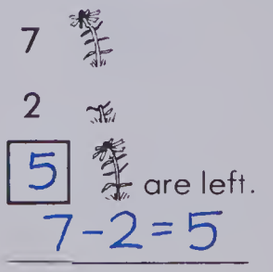
Print a number sentence for each picture.











UNIT 2 LESSON 1

Objective A1

Add to sums of 4 and 5.

Vocabulary

Add, plus, equals, number sentence, down (vertical), across (horizontal), addition names for numbers.

Materials

Counters: lima beans
Wooden blocks of two different colours
Crayons

Introducing the Lesson

Provide each student with four beans. Play "Shake and Separate" by having each student shake the beans in both hands, separate them into two hands, and read the *addition name* for 4. Record the names on the chalkboard as the students read them.

Teaching the Lesson

Provide each student with ten wooden blocks, five of each of two colours. Let them take turns reading an addition name for 5 from the list on the chalkboard, as the others build a model to match the name.

Using the wooden blocks, or larger objects such as books, ask a student to build a model for 4 or 5. The other students can then try to write a corresponding horizontal **addition sentence** on the chalkboard or on paper.

Introduce related horizontal and vertical *number sentences.* Use the horizontal sentences made by the students in the previous activity, and write the vertical sentences beside them. Do several examples with the students first, reading both forms aloud as each is written.

On the chalkboard, show the students how to draw a model to help solve both horizontal and vertical addition sentences.

4 X X X X 2 + 2 = □
+1 X
—

□ □



3 + 1 = 4	2 + 2 = 4	1 + 4 = 5	5 + 0 = 5
4 + 0 = 4	3 + 2 = 5	2 + 1 = 3	1 + 0 = 1
1 + 3 = 4	2 + 0 = 2	4 + 1 = 5	1 + 2 = 3
2 + 3 = 5	0 + 5 = 5	1 + 1 = 2	3 + 0 = 3

Sums to 5

twenty-one 21

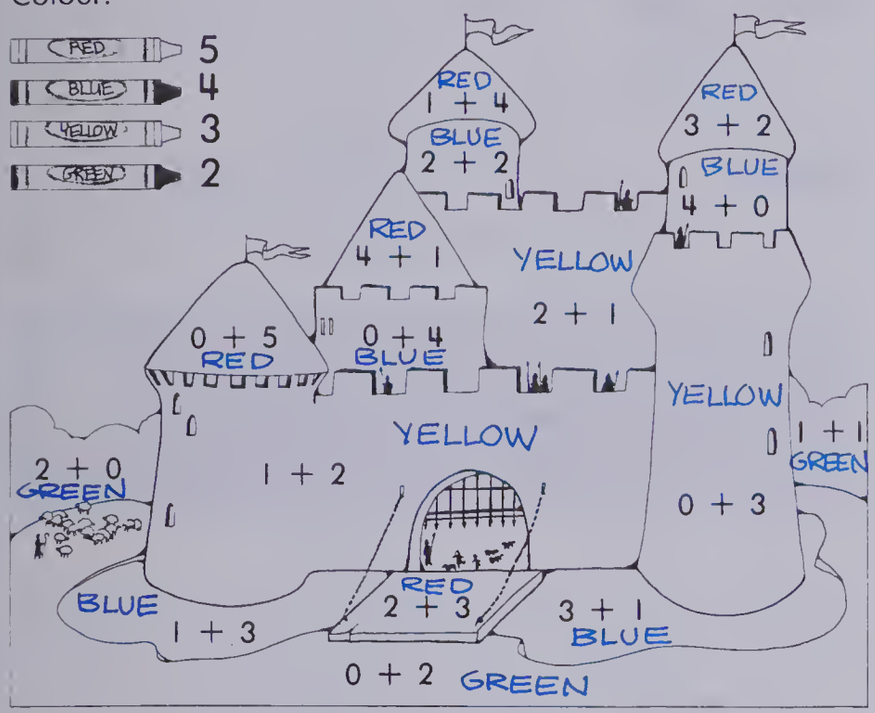
Using the Pages

- Use the illustration at the top of page 21 as a springboard for a discussion of the students' hobbies. The objects pictured can be talked about as addition models, for example: 3 balloons + 2 balloons = 5 balloons. There are appropriate models for all the vertical sentences on p. 21.
- Page 22 reviews sums to 5 with horizontal sentences. The bottom half of the page requires recognition of addition names for 2, 3, 4, and 5.

Add.

3 + 1 = 4	2 + 0 = 2	1 + 3 = 4
2 + 2 = 4	3 + 2 = 5	4 + 1 = 5
4 + 0 = 4	1 + 2 = 3	2 + 3 = 5
1 + 1 = 2	5 + 0 = 5	3 + 0 = 3
0 + 3 = 3	2 + 1 = 3	1 + 4 = 5

Colour.



Extra Practice

Worksheet A1
Pages 21-22

Add.

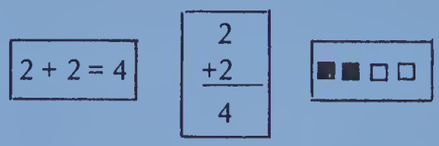
2 ○○ + 2 ○○ = 4	5 □□□□□ + 0 = 5	1 + 3 = 4	2 + 3 = 5
4 + 0 = 4	1 + 1 = 2	4 + 1 = 5	0 + 2 = 2
2 + 0 = 2	3 + 2 = 5		2 + 1 = 3

Circle names for:

5	2 + 2	(3 + 2)	3 + 1	(1 + 4) (0 + 5)
4	2 + 1	2 + 3 (2 + 2)	(4 + 0)	(1 + 3)

Reinforcement

1. Provide the students with three kinds of cards: horizontal sentences, vertical sentences, and pictorial models of these sentences. Ask the children to match the three forms.

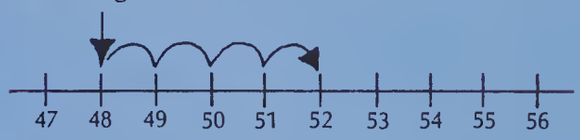


2. Provide number sentences, ask the students to illustrate them using subsets of two colours.

3 + 2 = 5 ♥♥♥♡♡

Enrichment

Since the theme of this unit is hobbies, encourage students to collect objects (bottle caps, rocks, stamps, cards, etc.) and to record how many are collected. These collections can be made individually or as a class. As the students add to the collections, have them use counting on and record the additions.
Monday — 48 rocks
Tuesday — 48 + 4 = 52 rocks
Use a number line to illustrate the counting on.



UNIT 2 LESSON 2

Objective A2

Add to sums of 6 and 7.

Vocabulary

Addition names, count on, addend, sum

Materials

Counters: bingo chips*
Playing cards
Wall number line
Floor number line
Paper plates

Introducing the Lesson

Use playing cards to encourage the students to add on to a collection by **counting on**:

"Here are 16 cards." 
"Now how many?"


Seventeen.


Seventeen, eighteen.

Use numbers to 99. Emphasize counting over bridges such as 49, 50, 51 etc. Practise with imaginary quantities:

"Pretend I have 78 cards here. (Add several.) Now how many?"

Practise with the wall number line.

Teaching the Lesson

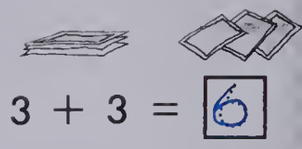
Use the floor number line and addition combinations to sums of 6 and 7 involving +0, +1, or +2. Ask for volunteers to come up and "walk out" the example. Have the students start at the greater *addend* and step as many times as the lesser addend requires.

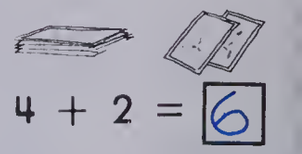
Provide the students with 6 bingo chips. Ask them to illustrate and record addition names for 6.

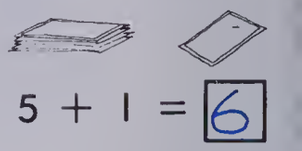
Repeat the same procedure with addition names for 7.

Place some bingo chips on each of two paper plates. Ask the students to describe, orally or in writing, how many are on each plate and how many there are in all. To emphasize the commutative property of addition, switch hands and ask for the corresponding number sentence.




3 + 3 = 6


4 + 2 = 6

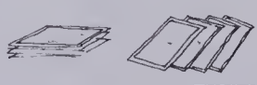

5 + 1 = 6


4 + 3 = 7


5 + 2 = 7


6 + 1 = 7


7 + 0 = 7


3 + 4 = 7


6 + 0 = 6

Add.

2 + 4 = 6 3 + 3 = 6 1 + 5 = 6

2 + 5 = 7 3 + 4 = 7 1 + 6 = 7

0 + 7 = 7 4 + 2 = 6 1 + 3 = 4

5 + 1 = 6 1 + 0 = 1 4 + 3 = 7

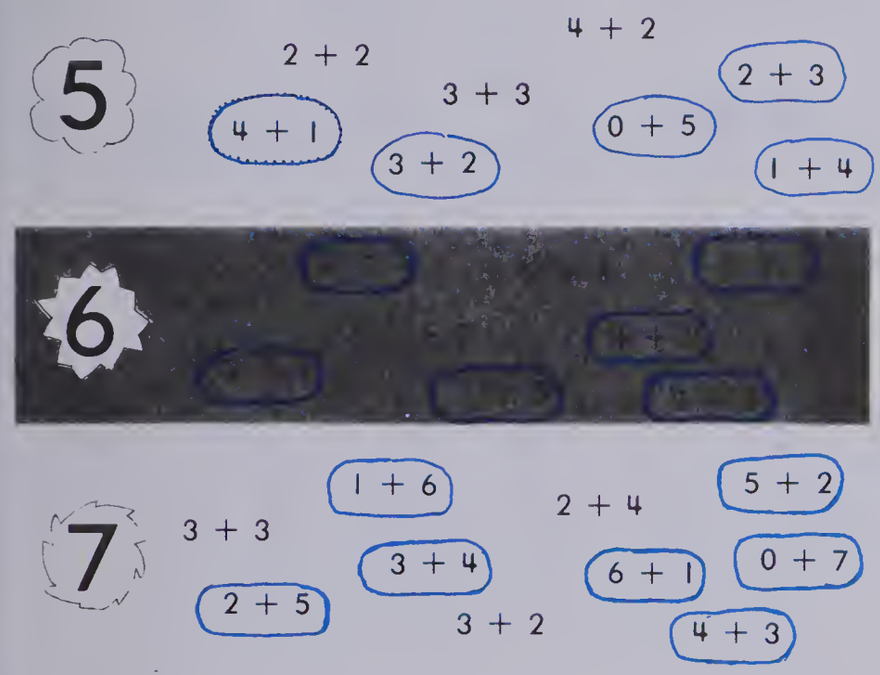
Using the Pages

- Talk about the hobby of card collecting as you point out the illustration on page 23. The card models emphasize counting on from the greater addend.
- Page 24 provides practice with sums to 7 in vertical form and with addition names for 5, 6, and 7.

Add.

2 + 5 = 7	5 + 1 = 6	4 + 3 = 7	1 + 6 = 7	1 + 5 = 6	4 + 2 = 6
0 + 7 = 7	3 + 2 = 5	3 + 3 = 6	5 + 2 = 7	3 + 4 = 7	1 + 4 = 5
4 + 3 = 7	6 + 1 = 7	5 + 0 = 5	2 + 4 = 6	2 + 3 = 5	0 + 6 = 6

Circle names for:



Extra Practice **Worksheet A2**

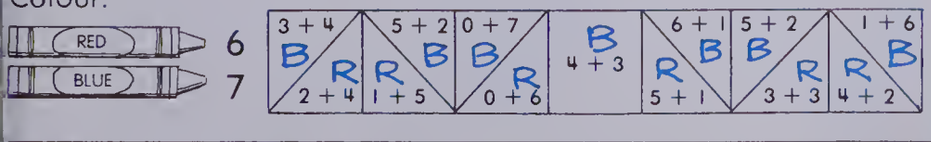
Pages 23-24

Add.

5 + 1 = 6	6 + 0 = 6	3 + 3 = 6
4 + 2 = 6	1 + 6 = 7	3 + 4 = 7

2 + 3 = 5	3 + 1 = 4	5 + 2 = 7	2 + 2 = 4	0 + 7 = 7	2 + 4 = 6	4 + 3 = 7

Colour.



Reinforcement

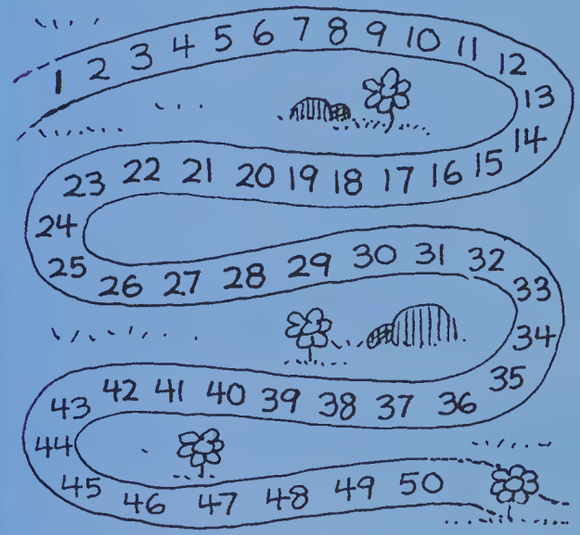
1. Provide a worksheet with a number line from 0 to 10 and open addition sentences to sums of 7. Ask the students to move their fingers on the number lines just as they walked on the floor number line in the lesson.

2. Prepare the following worksheet or chalkboard exercise.

2 + 3 =	4 + 3 =	0 + 0 =
4 + 1 =	2 + 2 =	5 + 2 =
3 + 0 =	5 + 1 =	1 + 1 =
3 + 4 =	1 + 0 =	6 + 1 =

Enrichment

1. Have the students draw a number road from 1 to 50. Provide a die for each pair of students. The die is a wooden cube with the numerals 1 to 6 on the faces. Have the students take turns rolling the die and counting on by that amount. The first one to reach the end wins. Encourage the students to count aloud each move on the road.



2. Play the game "Taking a Chance" as suggested in the Ideas section of the introduction to this unit.

UNIT 2 LESSON 3

Objective A3

Add to sums of 8.

Vocabulary

Add on, addends, sum, change order.
Direction words: Add on to make 8 fish in each bowl.

Materials

Counters: bingo chips*
Large sheets of paper
Number line to 100

Introducing the Lesson

Provide a large sheet of paper for each student. Show the class how to fold the paper into eight boxes. Give each student eight bingo chips. To generate a list of the addition facts with sums of 8, ask the students to put some bingo chips in some of the boxes and to count the empty boxes to determine the other addend.

After all the facts with sums of 8 have been listed, cover the list and call one addend. See how quickly the students can identify the other addend for each fact.

Teaching the Lesson

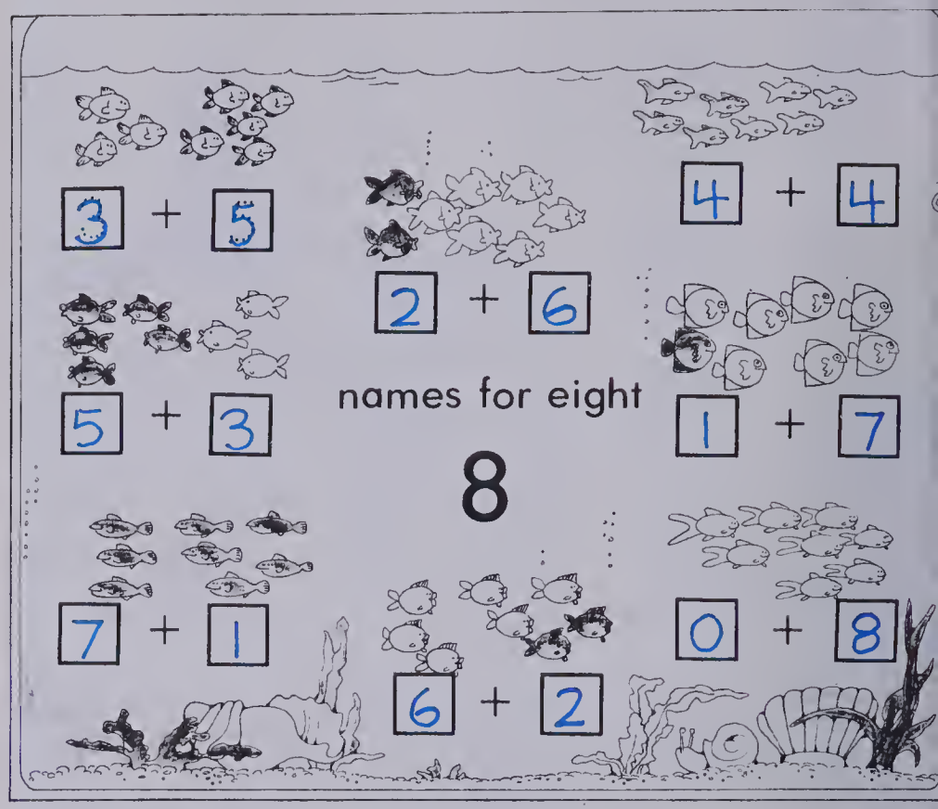
Ask the students to come up to the chalkboard and match the addition sentences. Discuss the order of addends. Does it matter which addend we start with? Does the sum change?

2 + 6 = 8	5 + 3 = 8
3 + 5 = 8	8 + 0 = 8
0 + 8 = 8	6 + 2 = 8

Show the 9 paper plates labelled 0 to 8 on the backs. Place a set of wooden blocks on each plate to match its number. Ask a student to come up and choose two plates, decide which is more, and turn the larger set's plate over so that only the number on the back shows. To find how many blocks in all, have the student count on from that number. Another student can record the appropriate number sentence at the chalkboard.



Six, seven, eight
6 + 2 = 8



Add.

2 + 6 = 8	3 + 4 = 7	4 + 2 = 6	5 + 3 = 8	1 + 5 = 6	4 + 4 = 8	5 + 2 = 7
3 + 3 = 6	1 + 7 = 8	8 + 0 = 8	2 + 3 = 5	6 + 2 = 8	1 + 6 = 7	3 + 5 = 8

Sums to 8

twenty-five 25

Using the Pages

- Talk about taking care of fish as a hobby as you show the illustration on page 25. Let the children relate their own experiences with a hobby.
- At the top of page 25, students are to give addition names for 8 by identifying different-coloured subsets. A review of addition facts with sums to 5, 6, 7, and 8 is given at the bottom of the page.
- Page 26 provides horizontal addition to sums of 8. At the bottom of the page, students are to add on to get eight fish in each bowl. One subset is drawn, and the students are to draw the other.

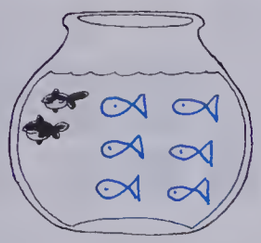
Add.

2 + 6 = 8	3 + 3 = 6	7 + 1 = 8
3 + 4 = 7	3 + 5 = 8	4 + 3 = 7
4 + 4 = 8	5 + 2 = 7	0 + 8 = 8
1 + 7 = 8	1 + 5 = 6	5 + 3 = 8
2 + 4 = 6	6 + 2 = 8	4 + 2 = 6
8 + 0 = 8	1 + 6 = 7	2 + 5 = 7

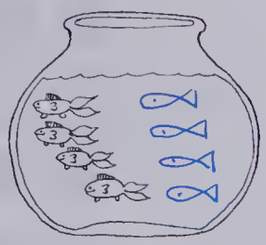
Add on to make 8 fish in each bowl.



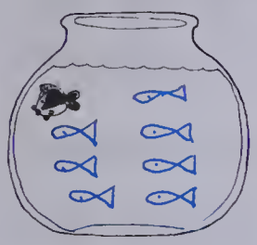
3 + 5 = 8



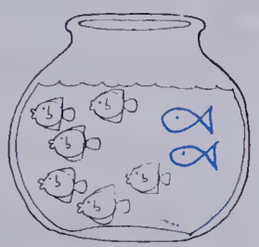
2 + 6 = 8



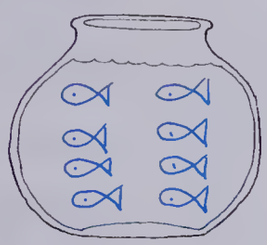
4 + 4 = 8



1 + 7 = 8



6 + 2 = 8



0 + 8 = 8

Extra Practice

Worksheet A3
Pages 25-26

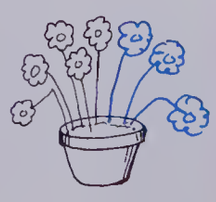
Add.

4 + 4 = 8	2 + 3 = 5	5 + 3 = 8
6 + 1 = 7	4 + 3 = 7	6 + 2 = 8
7 + 1 = 8	2 + 6 = 8	1 + 6 = 7
0 + 8 = 8	3 + 3 = 6	3 + 5 = 8

Add on to make 8 flowers in each pot.







Reinforcement

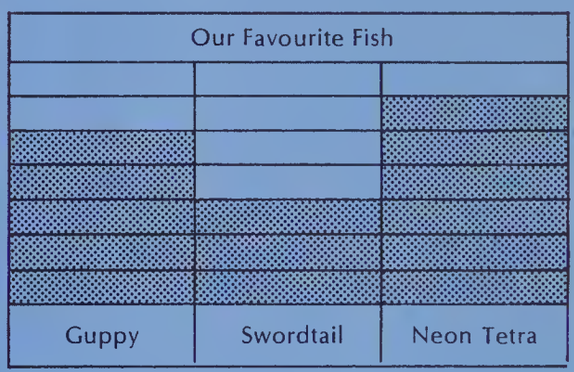
1. Using coloured stickers, have students make sets to match facts for 8, then use the cards as a matching game.



2. Prepare a number grid on which the students find addition names to sums of 8. (See the Ideas section of the introduction to this unit.)

Enrichment

1. Display pictures and talk about various kinds of aquarium fish. After the students have become somewhat familiar with three or four kinds, have them write on a piece of paper the kind of fish they would most like to have in their own aquarium. Encourage interested students to write an explanation of their preference in story form and to draw a picture of the fish. Once all the choices have been made, have the students make a bar graph of the results. Display the graph and the stories.



2. Provide the following worksheet, which requires the students to fill in the missing addend.

3 + □ = 7	6 + □ = 8
4 + □ = 6	1 + □ = 4
0 + □ = 5	5 + □ = 7
3 + □ = 8	1 + □ = 8

UNIT 2 LESSON 4

Objective A4

Add to sums of 9.

Vocabulary

Penny, nickel, dime, quarter, heads, tails, plus, addition names
Direction words: Colour to show names for 9.

Materials

Coins: Canadian* and foreign
Pennies*
Addition Name Cards
3 boxes labelled 7, 8, and 9

Introducing the Lesson

Discuss stamp and coin collecting as hobbies. Ask anyone who has such a collection to show it to the class. Using various coins (Canadian and foreign), discuss their differences: colour, size, value, pattern, shape.

Teaching the Lesson

Provide nine pennies for each student. Discuss the *head* and *tail* differences. Show the students how to shake the 9 coins in two hands, place them down on their desks, and to separate them into two sets: those with *heads* showing and those with *tails* showing. Record on the chalkboard the various addition names for 9 that the students find.

Use the list of names for 9 to practise counting on from the greater addend. Have the students decide which is the greater addend and then "clap on" the other addend.

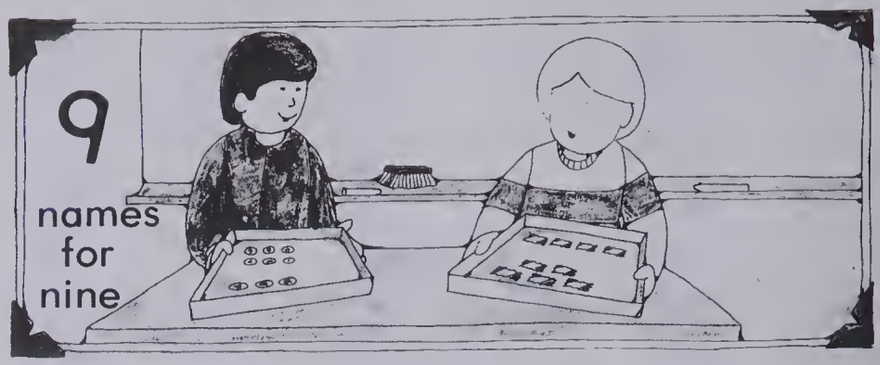
6 + 3 — Six. (Clap, clap, clap!) Nine in all.

6
+3
——

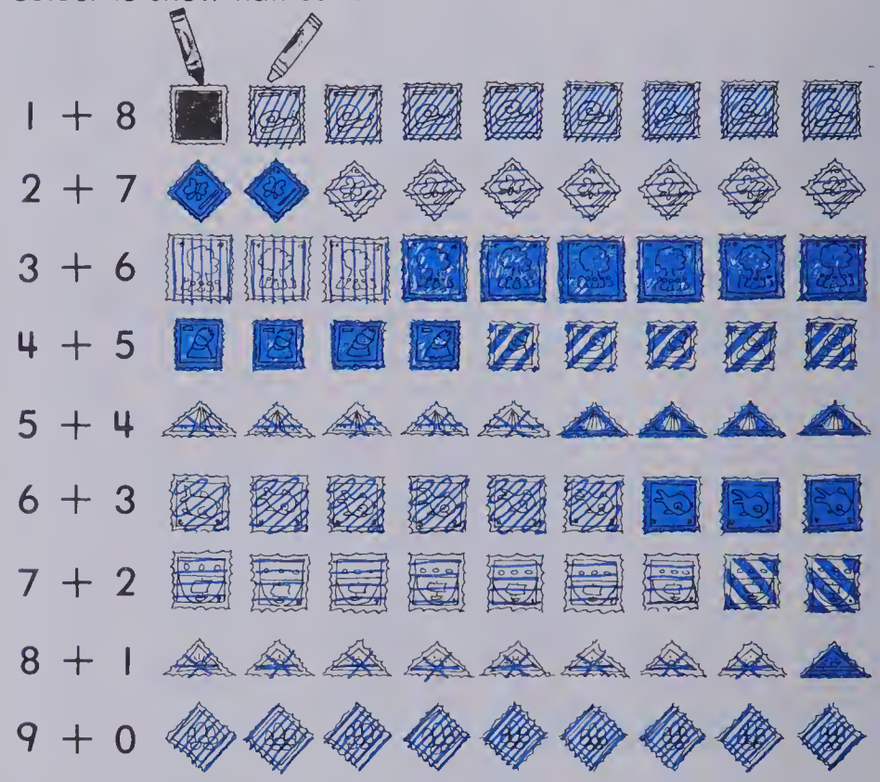


Nine in all.

Flash the Addition Name Cards as the students say the sums. For students who are not able to recall sums quickly, provide "thinking time" by not allowing responses for a few seconds and then signalling for the sum to be given.



Colour to show names for 9.



Using the Pages

- Discuss the collections pictured on page 27. The students must choose two different colours as they show the names for 9 on the page.
- The vertical addition facts at the top of page 28 require that a model for one addend be drawn. The horizontal facts at the bottom of the page provide a review of sums to 7, 8, and 9.

Draw. Add.

4 + 5 = 9	8 + 1 = 9	6 + 3 = 9	3 + 6 = 9
2 + 7 = 9	5 + 4 = 9	0 + 9 = 9	7 + 2 = 9
6 + 2 = 8	5 + 4 = 9	2 + 5 = 7	3 + 6 = 9
7 + 2 = 9	1 + 8 = 9	9 + 0 = 9	1 + 7 = 8

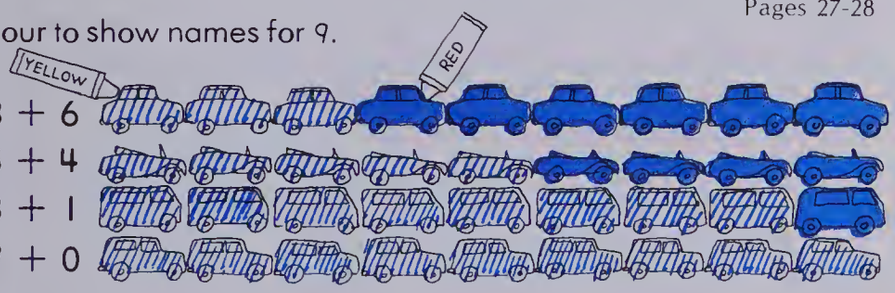
Add.

4 + 5 = 9	1 + 8 = 9	5 + 4 = 9
3 + 4 = 7	5 + 3 = 8	4 + 3 = 7
3 + 6 = 9	2 + 7 = 9	0 + 9 = 9
4 + 4 = 8	5 + 2 = 7	6 + 3 = 9

Extra Practice **Worksheet A4**

Pages 27-28

Colour to show names for 9.



Add.

6 + 3 = 9	4 + 4 = 8	8 + 1 = 9
2 + 6 = 8	5 + 4 = 9	3 + 4 = 7
0 + 9 = 9	4 + 2 = 6	5 + 3 = 8

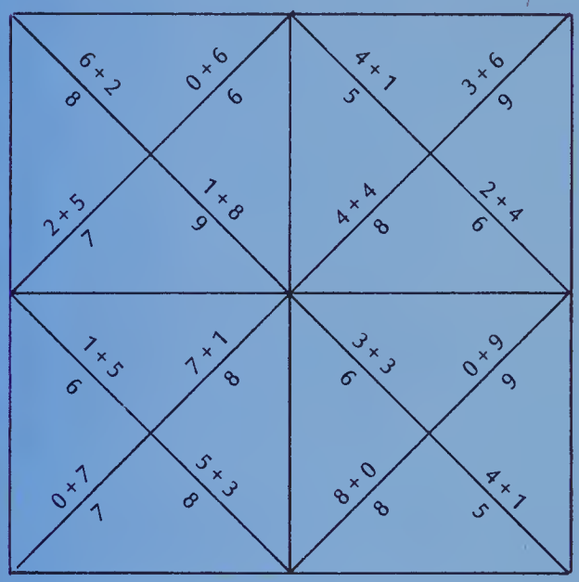
Reinforcement

1. Provide each student with 9 coins, paper, and a pencil. Have them play "Heads and Tails" individually (as in the lesson) and record the names for 9.

Names for 9	
Heads	Tails
3 + 6	
4 + 5	
2 + 7	

2. Provide Addition Name Cards, boxes labelled 7, 8, and 9, and counters for individuals who need extra practice in recognizing addition names.

3. Try this puzzle. The students are to glue the puzzle to stiff paper and cut it out. The puzzle can then be reassembled.



Enrichment

Encourage the students to write stories describing hobby collections they have. Ask them to show their collections to the class as they read their stories.

UNIT 2 LESSON 5

Objective PS1

Interpret and solve picture and word addition story problems.

Vocabulary

Add, plus, more, in all, altogether, join
Direction words: Print the addition number sentence.

Materials

Feltboard
Felt cutouts
Classroom objects: hats, books, toys, etc.

Introducing the Lesson

Draw pictures of addition situations on the chalkboard. "4 blue balloons, 2 red balloons. How many in all?" *Six balloons.* "Good." Gradually integrate these drawings into the context of a simple word problem. "John has four balloons in one hand and two in the other. How many balloons is he holding?"

Record a **number sentence** on the chalkboard to describe each problem situation. Encourage the children to think of the number sentence that answers the question.

Teaching the Lesson

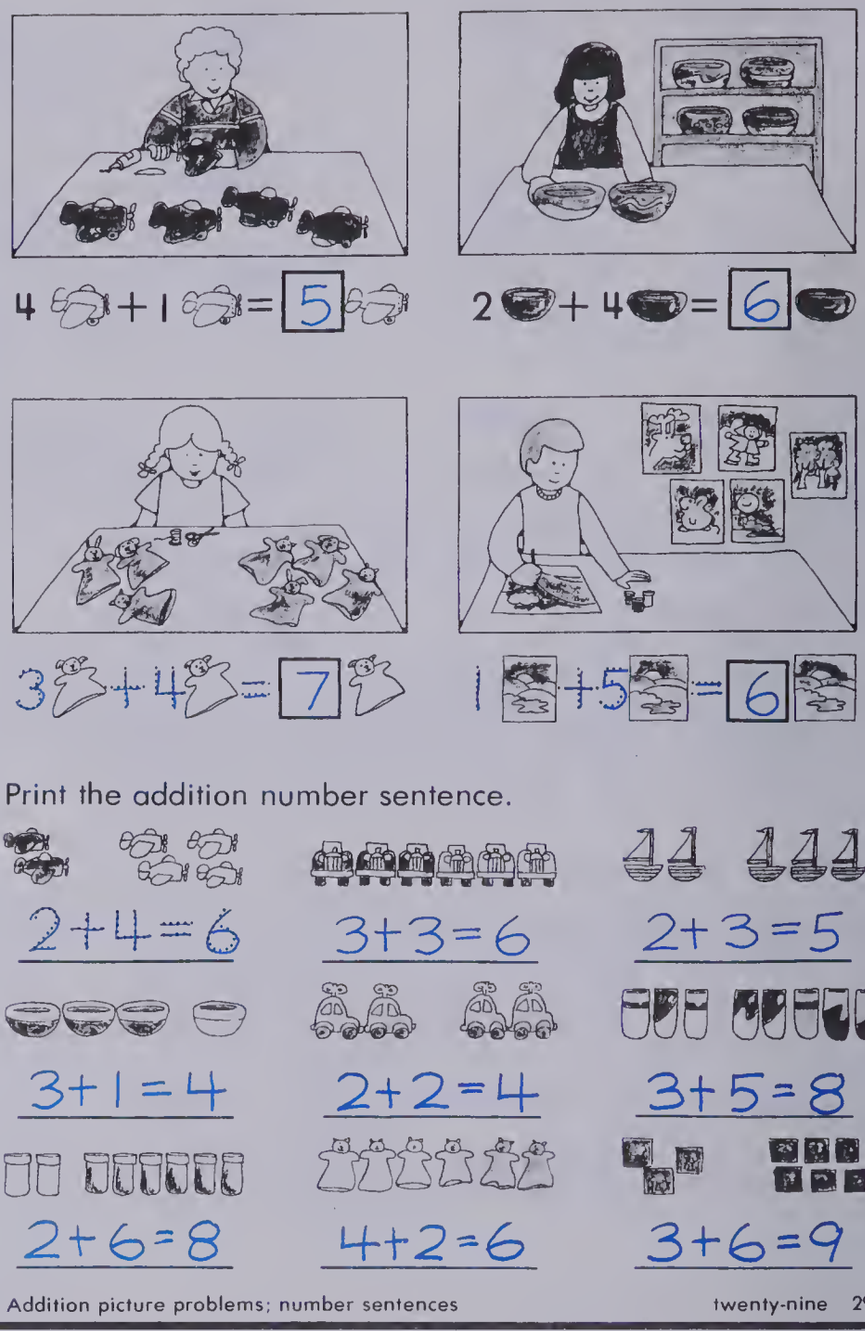
Using the feltboard, put up two different-coloured sets of felt cutouts, such as 3 red apples and 2 green apples. Have the students describe what they see and then try to describe the sets in a number sentence.

3 + 2 = 5

Do the same with the sets of classroom objects, but have the students try to tell a simple story to go with the sets.

"Janice found 3 books on the table and 4 on the floor. How many books did she find in all?"

Once the students have the idea, record some of the word problems on the chalkboard or on an experience chart. Later ask the students to read each problem aloud, draw an illustration, and write a number sentence.



Using the Pages

- Discuss the pictures at the top of page 29 with the students to help them interpret each picture and to associate the situation with a number sentence. The bottom exercise requires the translating of a pictured situation into a number sentence. Make sure that the printed directions are understood.
- Page 30 involves simple picture problems with and without number sentences provided. Do at least two examples with the students.



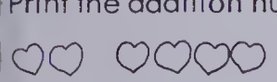
4 and 3 4 + 3 = 7 7 in all	2 and 4 2 + 4 = 6 6 in all
3 and 2 3 + 2 = 5 5 in all	1 and 4 1 + 4 = 5 5 in all
2 and 5 2 + 5 = 7 7 in all	4 and 4 4 + 4 = 8 8 in all
5 and 1 5 + 1 = 6 6 in all	2 and 7 2 + 7 = 9 9 in all

Addition picture problems: number sentences

Extra Practice

Worksheet PS1
Pages 29-30

Print the addition number sentence.



2 + 4 = 6



3 + 4 = 7



1 + 6 = 7



3 + 2 = 5



4 + 5 = 9



4 + 4 = 8



2 + 5 = 7



3 + 6 = 9



6 + 2 = 8

Reinforcement

1. Provide two sets of cards: pictures and corresponding number sentences for matching.

3 + 4 = □	

2. Start a class collection of picture and word story problems. Provide magazines for pictures and/or have the students draw illustrations of addition stories. Help the students to write simple sentence descriptions of the pictures. Use these as the basis of a Language Arts lesson on questions. As the students become able to ask appropriate questions about the pictures, record the questions on the story cards. The corresponding addition number sentence can then be written.



Al has 2 big cats and 6 little cats. — description
How many cats does Al have in all? — question
2 + 6 = 8 — number sentence

Enrichment

1. Have the students write a word problem to accompany the picture cards in the first Reinforcement activity.

> Jan's garden has 3 red flowers and 4 yellow flowers. How many flowers in all?

2. Prepare a worksheet of addition word problems involving easy vocabulary and the basic facts to 9.

> Jackie has 3 pencils.
> She got 6 more.
> How many has she now?

UNIT 2 LESSON 6

Objective A5

Subtract from 4 and 5.

Vocabulary

Subtract, take away, minus, subtraction names for numbers, equals, subtraction sentence

Materials

Buttons, chalk, wooden blocks

Introducing the Lesson

Provide each student with four small buttons. Give everyone an opportunity to act out a subtraction situation and then to ask the others to answer a question about it.

I have four. I take two away.
How many are left?

Repeat each example after the answer is given and checked, using **subtraction sentence** language. "Four minus two equals two." Write the corresponding sentence on the chalkboard: 4 – 2 = 2. Review the **minus** symbol for subtraction and how to read a subtraction sentence.

Teaching the Lesson

This lesson stresses subtraction in *take away* situations, with starting sets (minuends) to 5. To emphasize the starting set, have the students hold up their fingers. Say subtraction names from 5 as the students illustrate them using one hand.

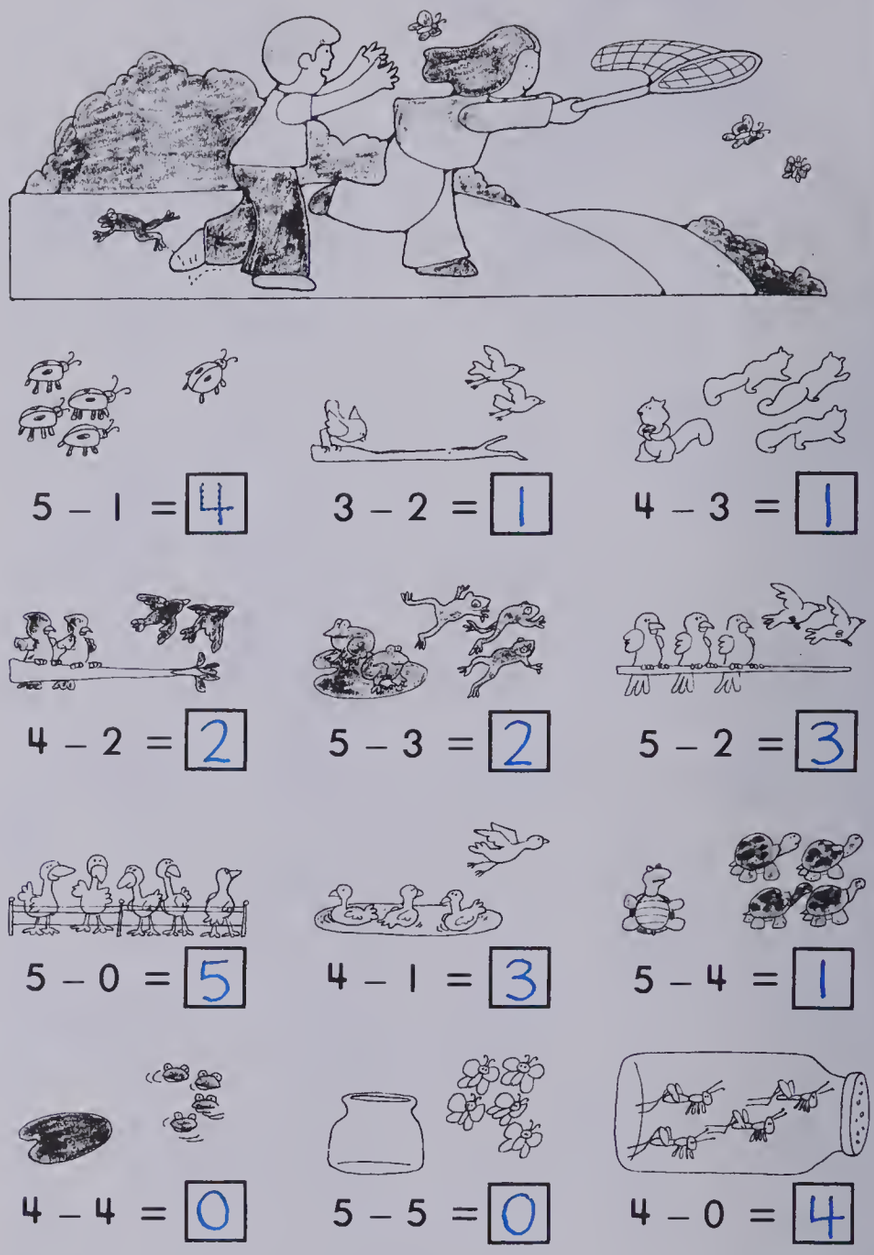


"Start with five." "Subtract two. How many are left?" *Three.*

Repeat the same procedure with hands out of sight behind backs and with hands out of use (make fists). This time use the words **minus** and **equals**.

"Five minus four equals . . . ?"

At the chalkboard, show both the horizontal and the vertical form for subtraction sentences. Give the students a chance to write both forms of a sentence on the chalkboard.



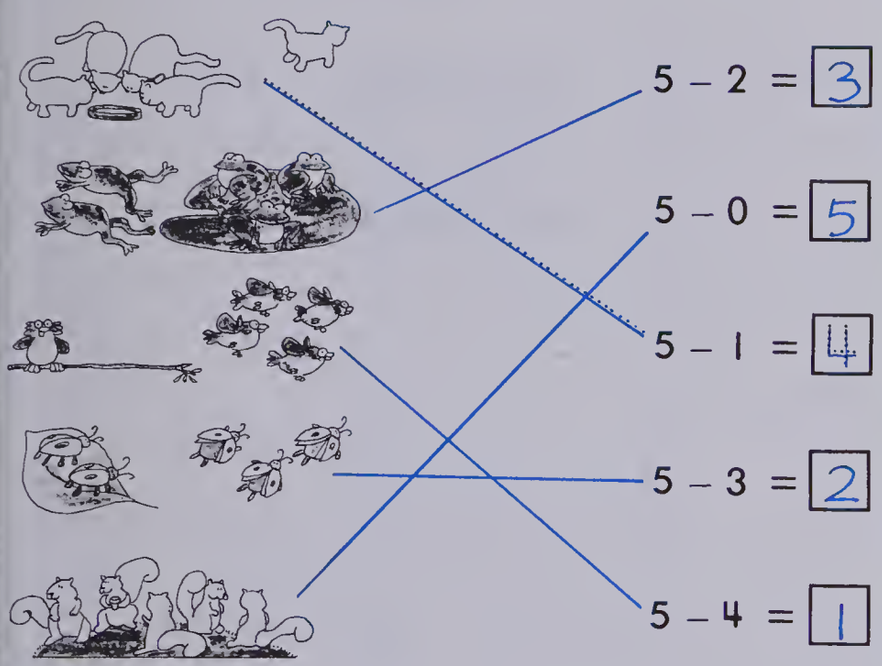
Using the Pages

- Discuss collecting insects and caring for various living things. Talk about the insects and animals pictured on page 31. Do several of the subtraction examples with the students to ensure that they can correctly interpret the pictures. First, establish how many there were to begin with; how many went away; then, how many are left.
- Page 30 involves subtraction examples without models and the matching of illustrations to the appropriate subtraction sentences.

Subtract.

5 − 3 = 2	4 − 2 = 2	5 − 1 = 4	3 − 0 = 3	5 − 4 = 1
4 − 3 = 1	5 − 2 = 3	3 − 2 = 1	5 − 5 = 0	2 − 1 = 1
4 − 1 = 3	2 − 2 = 0	5 − 0 = 5	3 − 1 = 2	4 − 4 = 0

Match. Subtract.



5 − 2 = 3

5 − 0 = 5

5 − 1 = 4

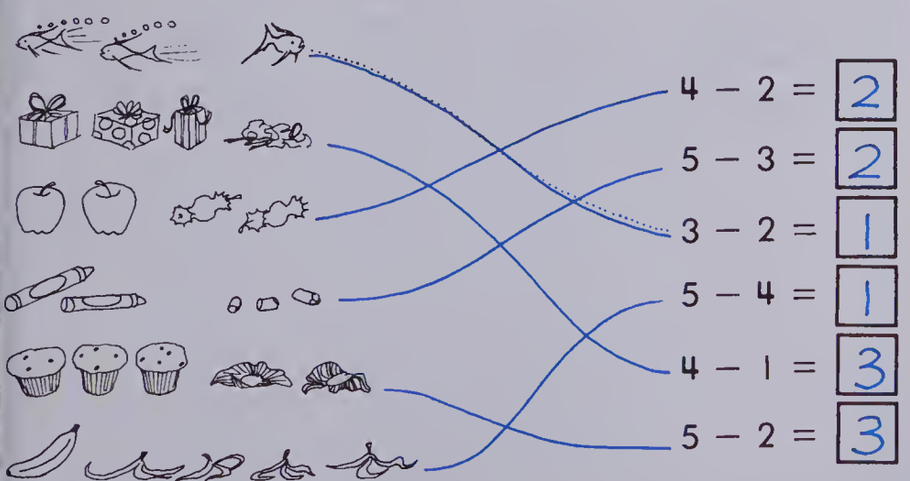
5 − 3 = 2

5 − 4 = 1

Extra Practice

Worksheet A5
Pages 31-32

Match. Subtract.



4 − 2 = 2

5 − 3 = 2

3 − 2 = 1

5 − 4 = 1

4 − 1 = 3

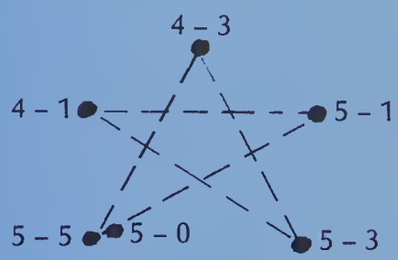
5 − 2 = 3

Reinforcement

1. Provide cards with horizontal and vertical forms of subtraction facts to minuends of 5 and corresponding illustrations for matching.



2. Have the students work the following dot-to-dot puzzle. After the subtraction questions have been answered, the dots can be connected in order.

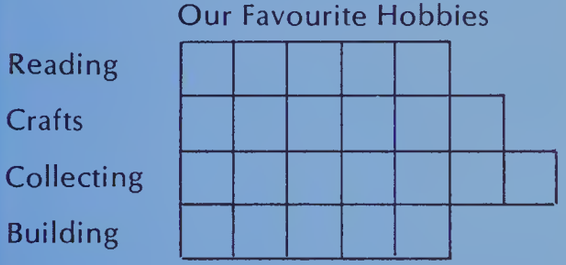


3. Play "Squish" as described in the Ideas section of the introduction to this unit.

Enrichment

Use pictures to graph and record the favourite hobbies of the children. Ask each student to draw his or her hobby on a 10 cm × 10 cm card.
Discuss categories for the hobbies, label a horizontal graph with these categories, and paste the pictures in place. Discuss the results. Ask individual students to explain how they got started on their hobbies.

Our Favourite Hobbies



UNIT 2 LESSON 7

Objective A6

Subtract from 6 and 7.

Vocabulary

Separate, subtraction sentence, starting set

Direction words: Cross out to subtract.

Materials

Counters: beans, bingo chips*

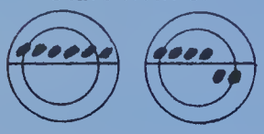
Paper plates with a dividing line

Subtraction Name Cards

Introducing the Lesson

Provide each student with a paper plate and 6 beans. Practise **separating** a starting set into subsets and illustrating a *subtraction sentence.*

"Start with 6."



"Separate two." (Subtract two.)

"How many left?"

Four.

Record the sentence, 6 – 2 = 4, on the chalkboard. For the first few times reinforce the subtraction sentence by repeating it aloud before recording it on the board. Later, a student can record the sentence.

Teaching the Lesson

Draw 6 or 7 objects on the chalkboard. Write an open subtraction sentence and ask a student to come up and cross out objects to show what the sentence says to do. Have the student record the remaining subsets (difference).

6 – 2 = □



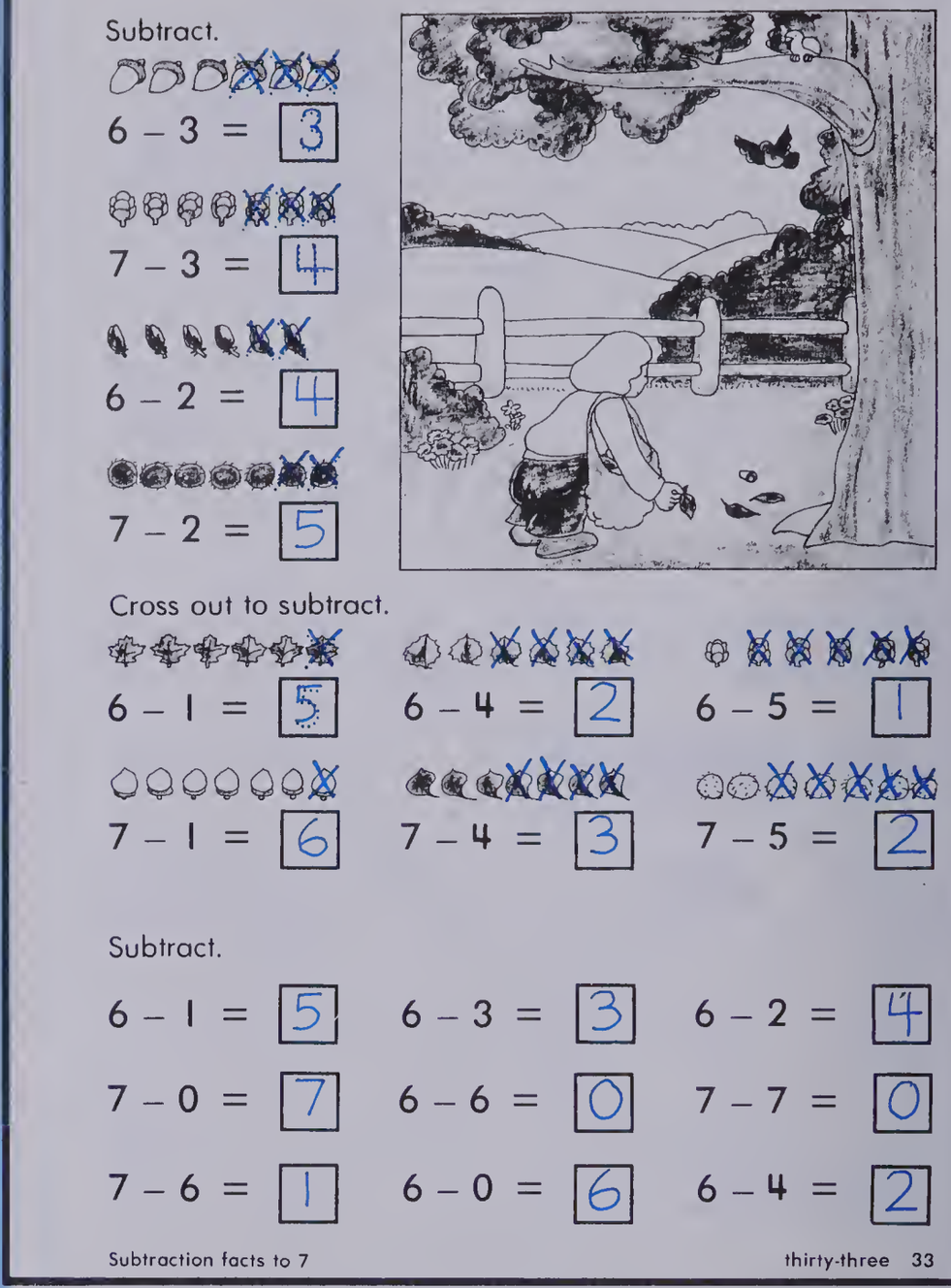
Write an open subtraction sentence on the chalkboard. Ask the students to come up and draw a model to solve it. Emphasize the *starting set.*

6 – 3 = □



"Start with 6. Subtract 3. That leaves 3."

Flash the Subtraction Name Cards. At first read each card: 6 – 2 "Six minus two is a name for . . .?" Continue flashing the cards, but after a while do so without reading them.



Subtract.

6 – 3 = 3

7 – 3 = 4

6 – 2 = 4

7 – 2 = 5

Cross out to subtract.

6 – 1 = 5 | 6 – 4 = 2 | 6 – 5 = 1

7 – 1 = 6 | 7 – 4 = 3 | 7 – 5 = 2

Subtract.

6 – 1 = 5 | 6 – 3 = 3 | 6 – 2 = 4

7 – 0 = 7 | 6 – 6 = 0 | 7 – 7 = 0

7 – 6 = 1 | 6 – 0 = 6 | 6 – 4 = 2

Subtraction facts to 7 thirty-three 33

Using the Pages

- Discuss the illustration on page 33. Talk about the autumn things that can be collected. See that the students understand the printed direction, "Cross out to subtract."
- At the top of page 34, students must complete the vertical subtraction sentences without models.
- Subtraction names for 2, 3, and 4 must be circled at the bottom of page 34. Do several examples with the students.

Subtract.

7 − 2 = 5	6 − 3 = 3	7 − 4 = 3	5 − 0 = 5	6 − 1 = 5
6 − 4 = 2	7 − 5 = 2	5 − 2 = 3	7 − 1 = 6	6 − 6 = 0
7 − 6 = 1	5 − 3 = 2	7 − 3 = 4	6 − 2 = 4	5 − 4 = 1

Circle names for:

3: 7 − 4, 5 − 1, 6 − 3, 4 − 1, 5 − 2, 7 − 5, 6 − 1, 7 − 2

2: 7 − 1, 6 − 5, 7 − 5, 5 − 3, 4 − 2, 6 − 3, 7 − 3, 6 − 4

4: 7 − 2, 5 − 4, 7 − 5, 7 − 3, 6 − 2, 5 − 1, 6 − 3, 4 − 0

Extra Practice **Worksheet A6**
Pages 33-34

Cross out to subtract.

6 − 3 = 3	7 − 2 = 5	6 − 5 = 1
7 − 4 = 3	7 − 1 = 6	6 − 2 = 4
5 − 2 = 3	6 − 5 = 1	7 − 7 = 0

Reinforcement

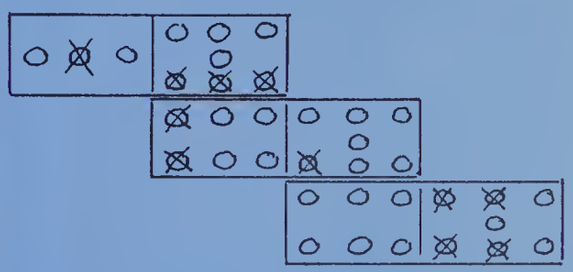
1. Provide a stamp and a list of open subtraction sentences. Ask the students to stamp a starting set and then cross out a subset to determine the remaining subset.

6 − 2 = ☐
5 − 3 = ☐
4 − 1 = ☐
7 − 3 = ☐
8 − 4 = ☐
5 − 2 = ☐
6 − 4 = ☐
7 − 2 = ☐



2. Have the students match subtraction models with domino-like cards. Cross out the dots to show the subtraction names. Subtraction sentences can then be written for the matching models.

6 − 2 = 4 matches 7 − 3 = 4.
7 − 1 = 6 matches 6 − 0 = 6.



Enrichment

1. Provide a small group of students with a die marked 1 to 6, and a pile of bingo chips. Each student in turn rolls the die, subtracts from 6 the number thrown, and takes as many chips as his or her answer indicates.

Six minus four equals two.
I take two chips.



The first to collect 20 bingo chips is the winner. The game can also be played subtracting from 7.

2. Ask the students to bring their favourite autumn object to school. Make a picture graph showing their choices (leaves, cones, nuts, etc.).

UNIT 2 LESSON 8

Objective A7

Subtract from 8.

Vocabulary

Subtract, go back, minus, compare, more, less, difference

Materials

Counters: beans
Paper plates
Floor number line
Subtraction Name Cards
Interlocking cubes

Introducing the Lesson

Give each student a paper plate and eight beans. Ask them to hide subsets of a given size with the paper plate and tell how many remain.

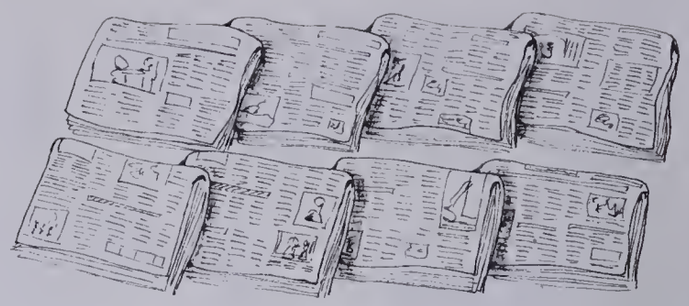
Teaching the Lesson

Use the floor number line to work subtraction questions. Say, and write at the chalkboard: 8 – 2. Ask a student to start at 8 on the number line and go *back* 2. The place where he or she lands after 2 steps is then recorded as the answer: 8 – 2 = 6 . Repeat with other subtraction examples for 8. Have the students repeat aloud the complete number sentence for each go-*back* example.

With the number line in view for reference, hold up Subtraction Name Cards one at a time. [8 – 4] Ask, "This is a name for . . .?" *Four.* "Yes, eight *minus* 4 equals 4."

Give each student 10 to 15 interlocking cubes. Ask them to join up to eight cubes. **Compare** the number of cubes joined by the students. "Who has more? How many more?" Explain how subtraction can be used to find the **difference**.

Talk about the *difference* between the numbers of cubes in each of several trains. Record a subtraction sentence for each example. Subtraction to solve comparison situations can be practised in oral lessons such as this. Follow-up written examples are not included on the pupil pages yet.

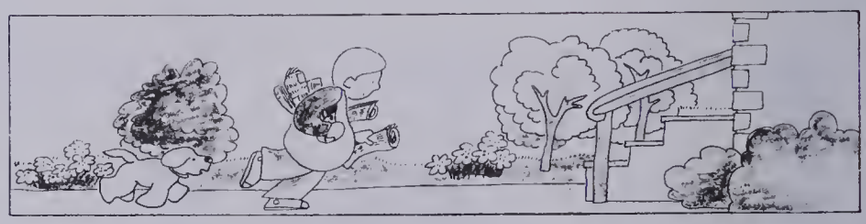


8

8 – 4 = 4 8 – 7 = 1 8 – 2 = 6

8 – 1 = 7 8 – 5 = 3 8 – 8 = 0

8 – 6 = 2 8 – 3 = 5 8 – 0 = 8



Try these.

8 – 2 = 6 7 – 3 = 4 8 – 6 = 2

7 – 7 = 0 5 – 4 = 1 7 – 5 = 2

8 – 5 = 3 8 – 3 = 5 8 – 1 = 7

6 – 3 = 3 6 – 2 = 4 8 – 4 = 4

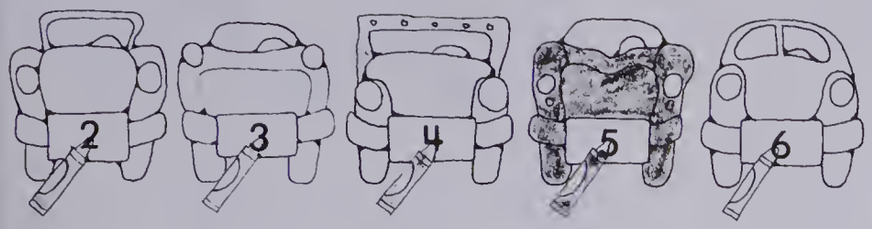
Subtraction facts to 8

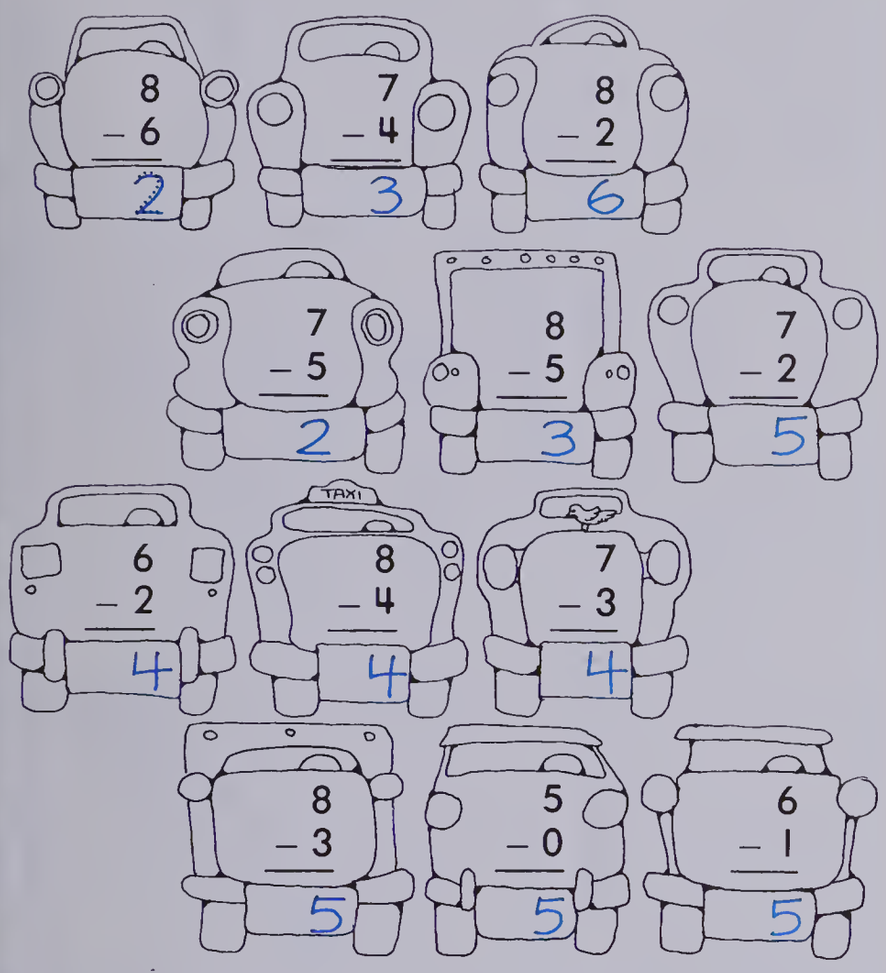
thirty-five 35

Using the Pages

- The top of page 35 pictures eight newspapers as the starting set for the exercise. Encourage students who cannot recall the differences to cover the newspapers to determine their answers. 8 – 4 = The students cover four newspapers and four newspapers are left. Provide counters for the examples at the bottom of the page, if necessary.
- Page 36 includes subtraction practice with colouring as a means of identifying subtraction names for numbers. The students can check their own work by number and/or colour.

Subtract and colour.





Extra Practice **Worksheet A7**
Pages 35-36

Subtract.

8 − 3 = 5	7 − 3 = 4	8 − 6 = 2	8 − 1 = 7
7 − 6 = 1	8 − 4 = 4	7 − 6 = 1	8 − 5 = 3

Circle names for:

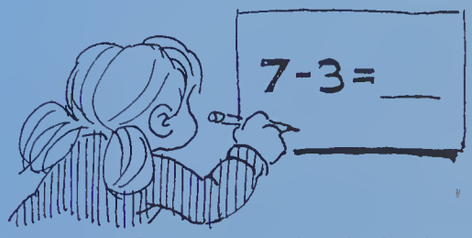
3	8 − 2	8 − 5	7 − 5	
	5 − 2	6 − 4	4 − 1	
4	8 − 4	6 − 2	7 − 3	5 − 1
	8 − 5	8 − 2	7 − 6	

Reinforcement

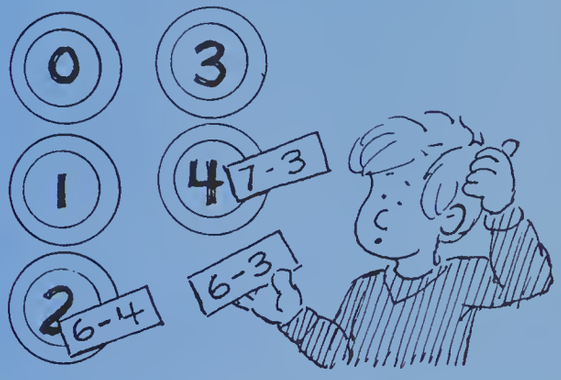
1. Provide a sheet of chart paper divided into sections numbered 0 to 8. Give the students turns throwing two beanbags on the sheet, then making a subtraction question for the other students to write and solve.



Seven minus three.



2. Use paper plates or cards labelled 0 to 8. Ask the students to sort the Subtraction Name Cards into the appropriate piles.



3. Prepare a subtraction-number-sentence grid worksheet as described in the Ideas section of the introduction to this unit.

Enrichment

1. Play a game in which the students guess a subtraction sentence. The sentence is acted out by the students on a floor number line. As this is done, the starting point is given: "I am starting at eight." The rest of the class must watch the number of jumps back and then determine the number sentence.

2. Play Bingo as suggested in the Ideas section of the introduction to this unit.

UNIT 2 LESSON 9

Objective A8

Subtract from 9.

Vocabulary

Separate, subtract, related sentences
Direction words: Put 9 bottle caps in each box.

Materials

Counters: bottle caps
Paper plates with a dividing line
A die
Subtraction Name Cards

Introducing the Lesson

Provide each student with 9 bottle caps and a paper plate. Give each student a chance to roll the die and tell the others what to *separate* or *subtract* from the group of nine. Record the different number sentences generated.





Nine minus four.
9 – 4 = 5

Teaching the Lesson

Using the list of number sentences just made, ask the students to match the sentences that are **related**. Help them to recognize that 9 – 4 = 5 is *related* to 9 – 5 = 4, 9 – 3 = 6 is related to 9 – 6 = 3, etc. Since the die soes not have a 7, 8, 9, or 0 on it, ask the students what the **related sentences** for 9 – 9, 9 – 8, 9 – 7, and 9 – 0 would be.

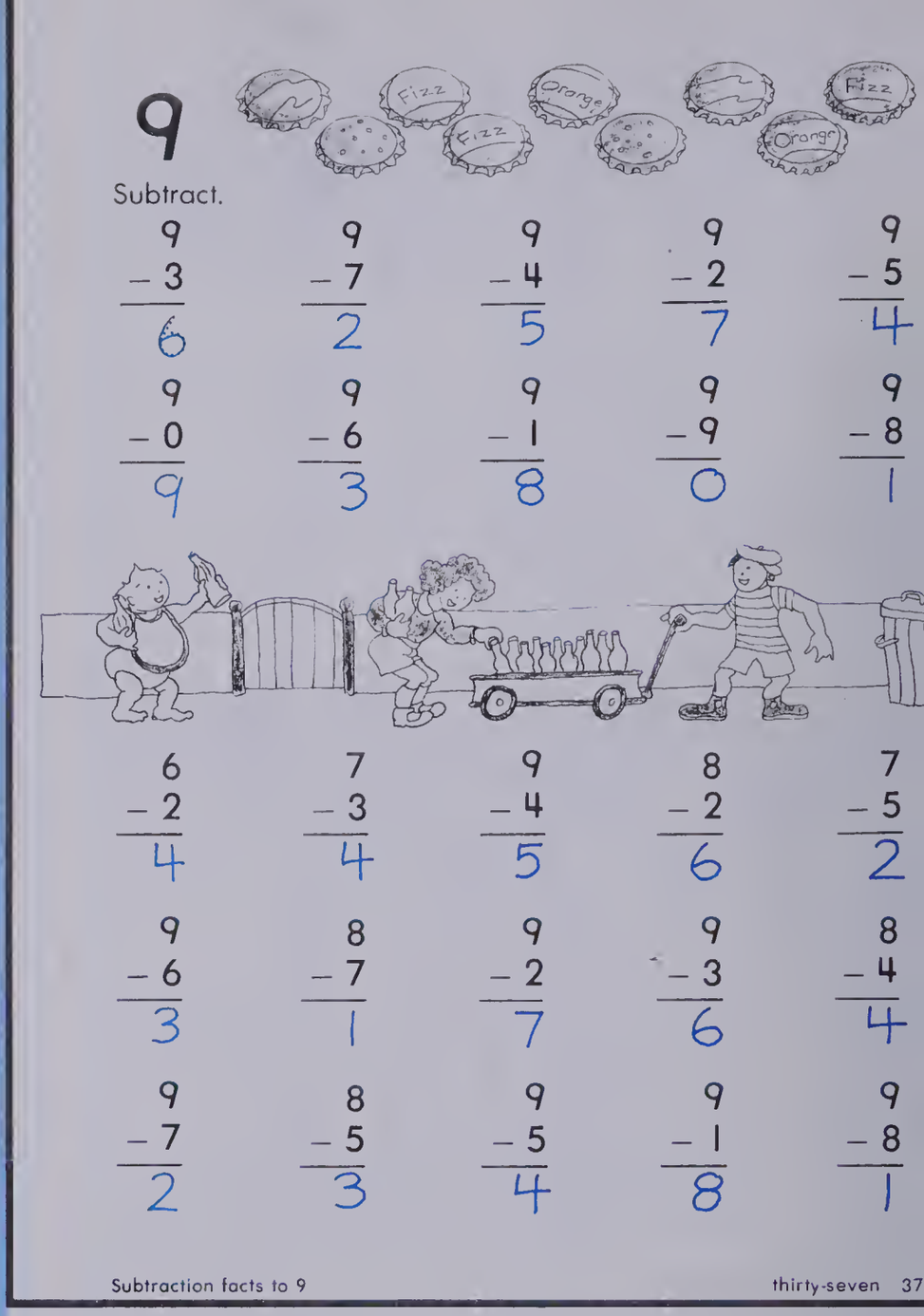
Say a number from 0 to 9. Ask, "What goes with 3 to make 9?" Have the students put 3 bottle caps on one side of their paper plates and the rest of the counters on the other side.

"Three and six makes nine."



Repeat, starting with different subsets.

Show the Subtraction Name Cards for 7, 8, and 9, one at a time. Have the students illustrate each Name Card with bottle caps on their paper plates to find the *difference*. Gradually, have them say the difference without illustrating the Name Card.



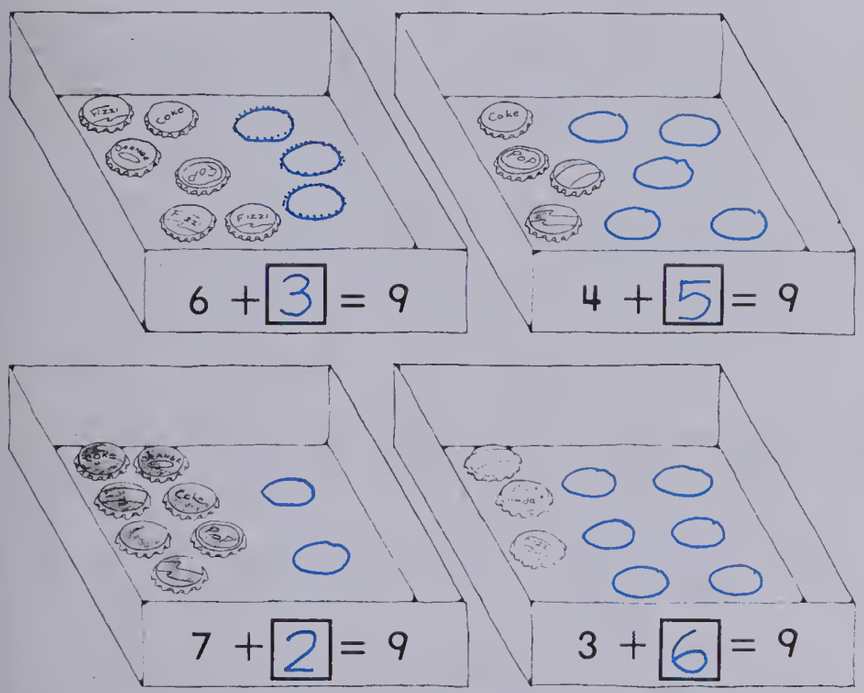
Using the Pages

- The exercise at the top of page 37 has an illustration of 9 bottle caps that can be used for partitioning a subset to determine the other subset. A review of subtraction facts from 6, 7, 8, and 9 is provided at the bottom of the page.
- A horizontal subtraction fact review is given at the top of page 38. At the bottom of the page, students are to draw more bottle caps in each box to have 9 in all.

Subtract.

9 – 2 = 7	9 – 4 = 5	9 – 8 = 1
8 – 5 = 3	8 – 6 = 2	8 – 4 = 4
9 – 6 = 3	9 – 5 = 4	9 – 0 = 9
9 – 1 = 8	7 – 6 = 1	9 – 7 = 2
7 – 3 = 4	9 – 3 = 6	8 – 3 = 5

Put 9 bottle caps in each box.



Extra Practice **Worksheet A8**
Pages 37-38

Subtract.

9 – 6 = 3	8 – 4 = 4	9 – 1 = 8
6 – 3 = 3	9 – 5 = 4	8 – 7 = 1
9 – 2 = 7	8 – 5 = 3	9 – 4 = 5
7 – 4 = 3	9 – 1 = 8	9 – 3 = 6

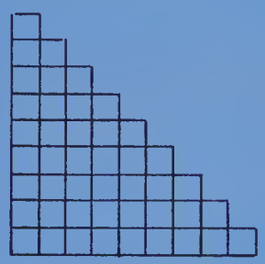
Draw 9 apples on each plate.

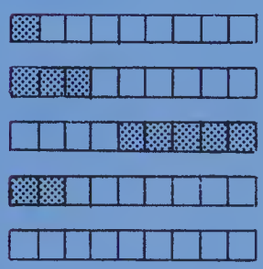


2 + 7 = 9 4 + 5 = 9 1 + 8 = 9

Reinforcement

1. Using interlocking cubes, have the students build stairs from one to nine, each in a different colour. Then ask them how to find 2 stairs that, if joined, would have 9 cubes in all. Have them record the names for 9.



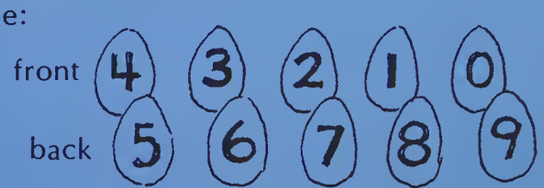


2. Play the die game, from the Introducing the Lesson section, with paper and pencil. Have the students roll a number and call out a subtracting-from-9 example. The other students record the example and complete the open sentence. Check each example orally before the next is given.

3. Prepare timed drill sheets as suggested in the Ideas section of the introduction to this unit.

Enrichment

For use as a guessing game in future lessons, have the students prepare three sets of 5 egg shapes each in different colours of construction paper. (Provide an egg-shaped tracer, about 15 cm long, for each set of eggs.) The students are to label both sides of the egg with numbers that add up to 7, 8, or 9. For example, the "9" eggs would be:



Use each set separately. Have the students try to guess, while looking at one side, what number is hidden.

UNIT 2 LESSON 10

Objective PS2

Interpret and solve subtraction picture problems and subtraction word problems.

Vocabulary

Number sentence, take away, minus, less, part, whole

Materials

Food (raisins, cookies, candy)
Paper
Pencils
Crayons

Introducing the Lesson

Use edibles, such as raisins, chocolate chips, cookies, or candy. Choose students to come up and act out subtraction story problems. Record a number sentence for each. Gradually encourage the students to write the number sentence at the chalkboard.

John has five raisins.
He eats two of them.
How many raisins are left?

5 – 2 = 3

Teaching the Lesson

Using the felboard and cutouts, show a subtraction name and ask a student to come up and tell a story that goes with the name.

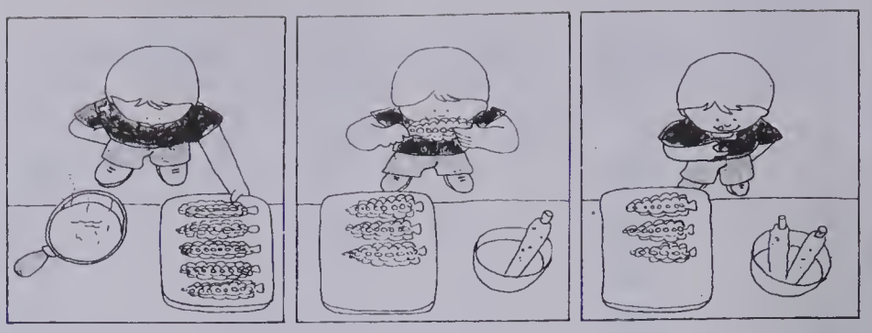
There are 6 birds in the tree.
Three fly away.
How many are left?



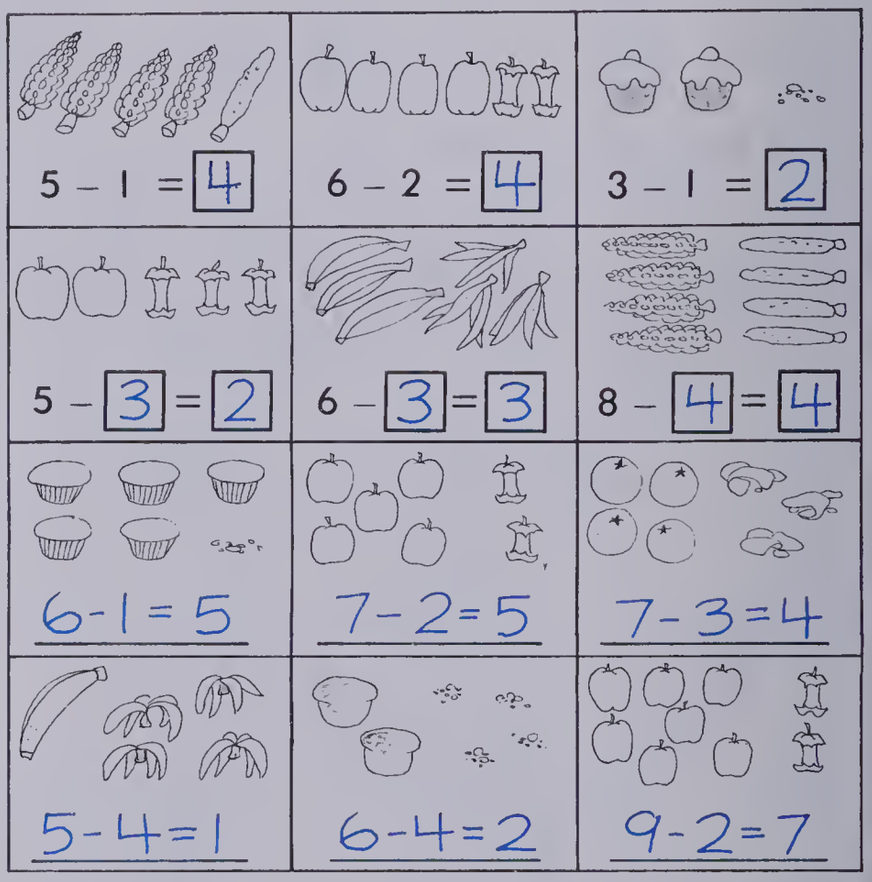
Provide each student with paper, pencil, and crayons. Ask them to think of a take-away or a part-whole subtraction situation and to draw a picture of it. Ask the students to show their drawings one at a time, so that each subtraction situation can be discussed. Write the situation in words at the chalkboard. Have the other students record the corresponding subtraction sentence.

7 glasses are on a tray.
4 have grape juice.
7 – 4 = 3
3 glasses are empty.





5 5 – 2 5 – 2 = 3



Subtraction picture problems; number sentences thirty-nine 39

Using the Pages

- Discuss the sequence of pictures at the top of page 39. The students are to interpret the picture below and to identify the appropriate subtraction sentence that describes the picture. All illustrations involve situations in which food has been eaten. Do several examples orally to start. Emphasize how many were there to begin, how many were eaten, and how many are left.
- Page 40 involves simple word problems with and without number sentences provided.

Problem Solving Activities

Assign Level 2, Unit 2



Sam made 5 . Bob ate 3 . 5 − 3 = 2 2 are left.	Ann made 7 . Sam ate 2 . 7 − 2 = 5 5 are left.
Bob made 3 . Ann ate 1 . 3 − 1 = 2 2 are left.	Sam made 8 . Ann ate 5 . 8 − 5 = 3 3 are left.
Bob made 6 . Sam ate 3 . 6 − 3 = 3 3 are left.	Ann made 5 . Bob ate 2 . 5 − 2 = 3 3 are left.
Sam made 9 . Ann ate 3 . 9 − 3 = 6 6 are left.	Bob made 6 . Bob ate 2 . 6 − 2 = 4 4 are left.

Subtraction picture problems; number sentences

Extra Practice **Worksheet PS2**

Pages 39-40

Jack had 6 . Ann took 2 . 6 − 2 = 4 4 are left.	Bill had 7 . Joe took 3 . 7 − 3 = 4 4 are left.
Sue had 8 . Dad ate 3 . 8 − 3 = 5 5 are left.	Pat had 9 . Tom took 4 . 9 − 4 = 5 5 are left.

Reinforcement

1. Distribute cards with an open subtraction sentence on each: 5 − 3 = □, 6 − 2 = □, 7 − 0 = □. Provide another blank card for the students to draw a corresponding picture. Use the cards in a matching game.

6 − 2 = □	○ ○ ○ ○ ⊗ ⊗

2. Prepare and display cards having either picture or word subtraction problems. Encourage the students to solve and write the appropriate number sentence for as many as they can.

1. Picture problem cards





2. Word problem cards

John has 6 . 4 are his. 6 − 4 = □ ____ are not his.	Alice made 7 . She gave away 4. 7 − 4 = □ ____ are left.

3. Provide paper for the students to draw pictures that match the problem situations on page 40.

Enrichment

1. Encourage the students to make word subtraction story problems on cards for the rest of the class to solve.

2. Challenge the students with the following addition and subtraction number sentences which require that a missing number be found.

6 + □ = 9	□ + 2 = 6
8 − □ = 4	□ + 0 = 5
5 + □ = 7	□ − 7 = 2
8 − □ = 4	□ − 3 = 4

UNIT 2 LESSON 11

Objective A9

Add or subtract related sentences.

Vocabulary

Opposites: add-subtract, plus-minus, take away-give back, related facts
Direction words: Can you help Bozo find the missing number?

Materials

Counters: beans
Paper plates
Numeral cards 0 to 9
Symbol cards: +, –, =

Introducing the Lesson

Give each student nine or ten beans and a paper plate. Ask them to illustrate *related* addition and subtraction situations. Emphasize the **opposite** operations.

"Start with 2.
Add 5.
How many in all?" *Seven.*

"Now you have 7.
Subtract 5.
How many are left? *Two.*

Record the number sentences for the addition and the subtraction example: 2 + 5 = 7, 7 – 5 = 2. Point out that addition and subtration are *opposite* actions and that the two number sentences are called **related facts**. Have the students illustrate several other sets of related facts.

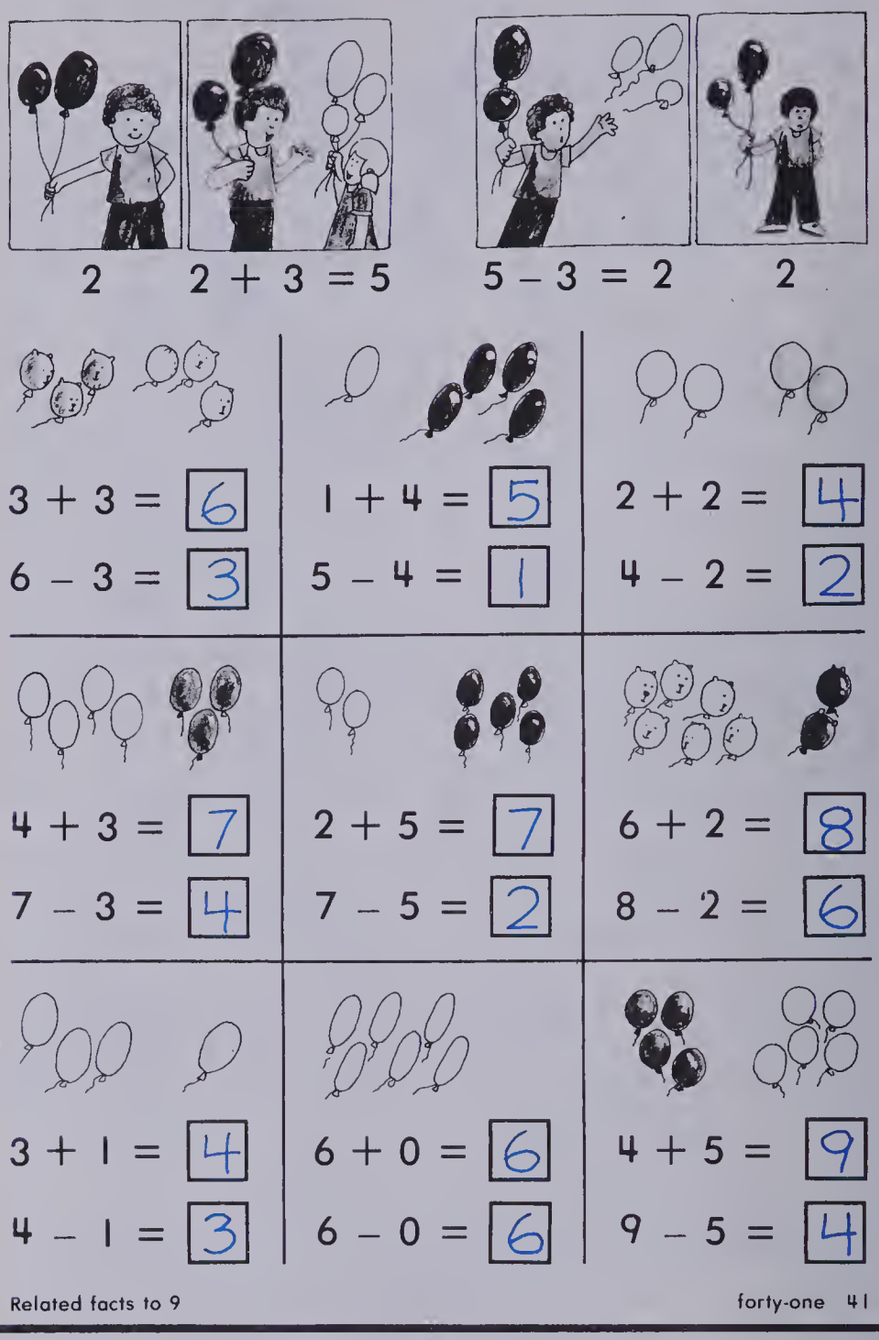
Teaching the Lesson

Use numeral and sumbol cards. Choose three numeral cards that would make a number sentence. Ask the students to try to write a number sentence using the three numbers and the symbols + or – and =. Have the students show their sentences to the rest of the class.

5	+	3	=	8
8	–	3	=	5

Gradually encourage the students to write as many sentences as possible and to look for number sentence families.

5 + 3 = 8 8 – 3 = 5 3 + 5 = 8 8 – 5 = 3



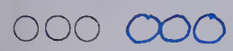
Using the Pages

- Discuss the cartoon on page 41 with the students, emphasizing the opposite actions of adding 3, then subtracting 3, to end up with the same initial subset. Discuss several pictures that can be interpreted as addition and then as subtraction situations.
 3 + 4 = 7 in all, or 7 – 4 = 3.
 Have the students cover up or cross out 4 to emphasize the subtraction interpretation.
- At the top of page 42, students are to draw the set to be added, or to cross out the set to be subtracted. With less able students, do the bottom of page 42 as a group, using paper plates and beans as suggested in the Teaching the Lesson section.

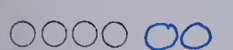
Draw. Add.



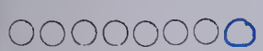
5 + 2 = 7



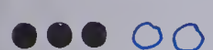
3 + 3 = 6



4 + 2 = 6



7 + 1 = 8



3 + 2 = 5

Cross out. Subtract.



7 – 2 = 5



6 – 3 = 3



6 – 2 = 4

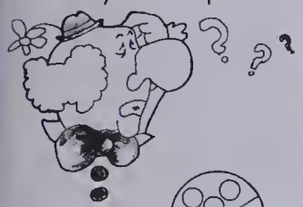


8 – 1 = 7



5 – 2 = 3

Can you help Bozo find the missing number?





3 + 1 = 4



4 + 2 = 6



5 + 2 = 7



2 + 3 = 5



1 + 3 = 4

Extra Practice **Worksheet A9**

Pages 41-42

Draw. Add.



6 + 3 = 9

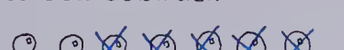


2 + 6 = 8



4 + 5 = 9

Cross out. Subtract.



7 – 5 = 2



9 – 6 = 3



8 – 2 = 6

Reinforcement

1. Have the students work in pairs: one illustrates with counters and the other records on paper. Ask them to illustrate and record a pair of related open sentences.

5 – 2 = ☐



Start with 5. Subtract two.

5 – 2 = 3

Three plus two is five in all.

3 + 2 = 5



Have the students switch roles after each example.

2. Provide Numeral Cards for the students to use as they find related sentences.

4 + 3 = 7 7 – 4 = 3

3. Prepare the following worksheet to review addition and subtraction facts to 9. Students are to colour all answers *less than* 6 red, *equal* to 6 yellow, and *more than* 6 blue. If done correctly, a yellow 6 appears on a red-and-blue checkered background.

9 – 6	9 – 3	7 – 5	5 + 2	4 – 4
8 – 1	6 + 0	6 + 3	9 – 4	9 – 2
6 – 4	4 + 2	3 + 3	5 + 1	3 – 2
4 + 5	7 – 1	2 + 5	8 – 2	1 + 8
8 – 7	6 – 0	1 + 5	2 + 4	8 – 4

Enrichment

1. On a worksheet, write several sets of 3 related numbers. Ask the students to record the 4 different number sentences of a fact family using the numbers.

2. Pass out the Addition and Subtraction Name Cards from 0 to 9. Ask the students to sort them according to the number each names. Have the students prepare a bar graph showing how many names they found for each of the numbers from 0 to 9.

UNIT 2 LESSON 12

Objective PS3

Add or subtract to solve picture problems.

Vocabulary

Add on, take away, number sentence

Materials

Artificial flowers
Paper
Crayons

Introducing the Lesson

Place three artificial flowers in a planter box. Ask the students to come up and act out a problem. "Three flowers are planted here. Now plant six more. How many flowers are there in all?"

Ask another student to record a number sentence to match the problem situation: 3 + 6 = 9.

Repeat this procedure using both addition and subtraction situations. "Bill planted six flowers. He picked three for his mother. How many are still in the garden?"

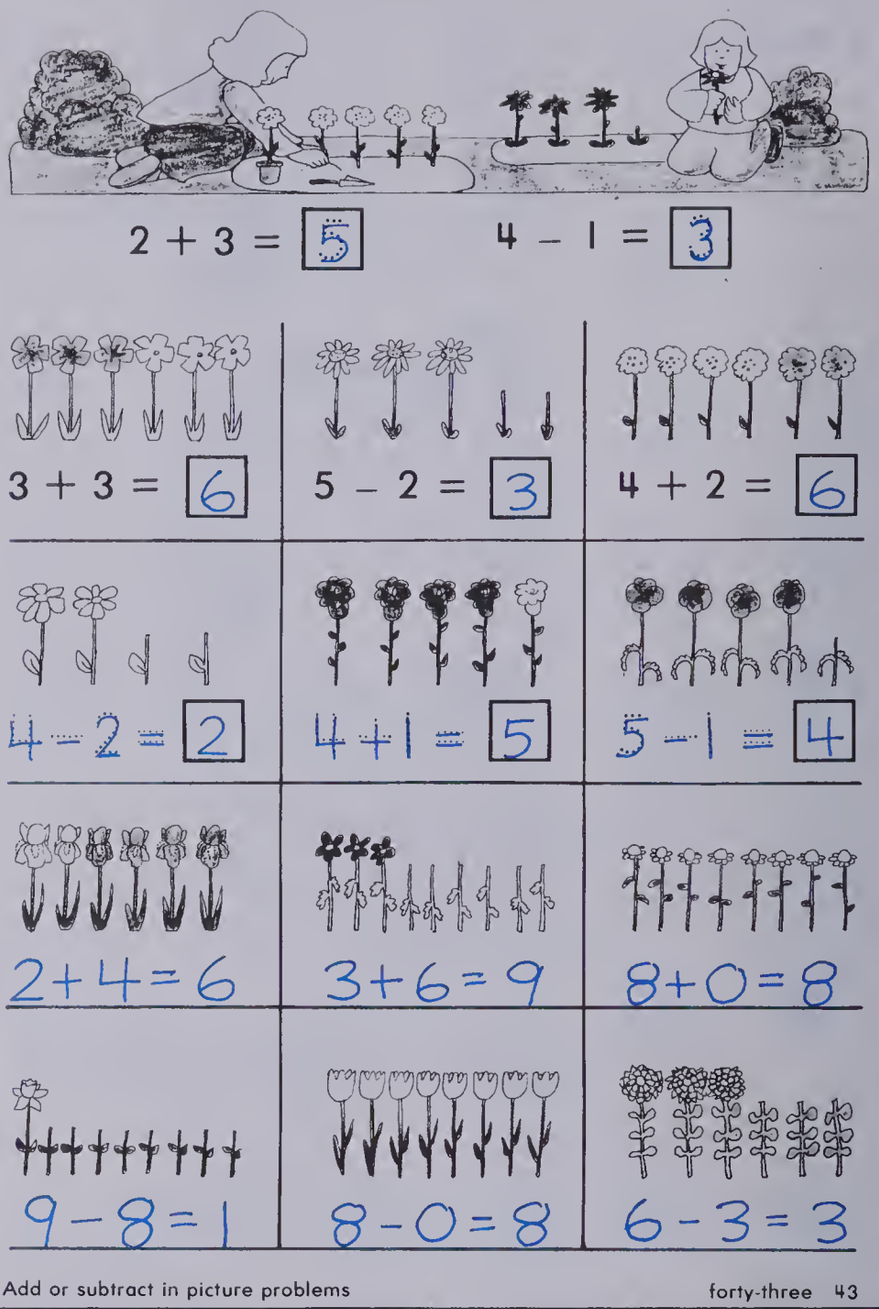


Teaching the Lesson

Provide the students with paper and crayons. Ask them to think of an addition or subtraction situation and to draw a picture of it. Remind them that objects are *added on* to the initial set when we add and that objects are *taken away* from the initial set when we subtract. Have these drawings shown to the rest of the class so that the corresponding number sentences can be written.

Reinforcement

Pass out paper, pencils, counters, 2 regular dice, and one operation die (+ and – on the faces). Have the students roll the dice and print a number sentence using the numbers and the operation that turn up. Counters can be used to solve the sentences, if necessary.



Using the Page

- Do the first two examples on page 43 with the students to ensure that they interpret the pictures correctly (particularly the picked flowers as subtraction). Emphasize that for the subtraction examples they must identify how many plants were there at first, how many were picked, and how many are left.

Enrichment

Ask the students to fill in the missing operation signs.

Let the students discover that either a plus or a minus sign can be used for the last example.

3 △ 2 = 5	4 △ 5 = 9
4 △ 3 = 1	7 △ 3 = 4
8 △ 4 = 4	6 △ 2 = 8
9 △ 8 = 1	8 △ 5 = 3
6 △ 3 = 9	1 △ 7 = 8
5 △ 5 = 0	6 △ 0 = 0

UNIT 2 TEST

Part 1: Adding with sums to 9.

Part 2: Subtracting from numbers to 9.

Part 3: Writing addition and subtraction sentences for pictures and problem situations.

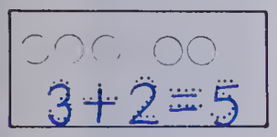
Add.

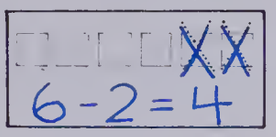
3 + 4 = 7	4 + 2 = 6	1 + 7 = 8	2 + 5 = 7	3 + 3 = 6	6 + 0 = 6
8 + 1 = 9	4 + 4 = 8	2 + 3 = 5	3 + 4 = 7	4 + 5 = 9	2 + 2 = 4

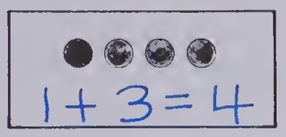
Subtract.

7 − 2 = 5	6 − 4 = 2	4 − 3 = 1	5 − 2 = 3	8 − 5 = 3	7 − 4 = 3
9 − 4 = 5	5 − 4 = 1	6 − 1 = 5	7 − 3 = 4	9 − 0 = 9	8 − 7 = 1

Print a number sentence for each picture.







3 and 4 .

3 + 4 = 7

7 in all.

6 .

3 run away.

6 − 3 = 3

3 are left.

Extra Practice **Worksheet PS3**

Page 43



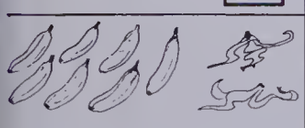
3 + 2 = 5



8 − 2 = 6



7 + 1 = 8



9 − 2 = 7



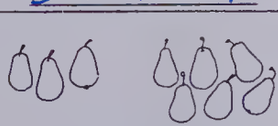
5 + 4 = 9



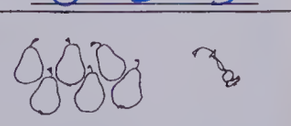
8 − 3 = 5



9 − 3 = 6



3 + 6 = 9



7 − 1 = 6

UNIT 3
Numeration to 100

Theme: Using Money

Lesson		Objective	Pages
1	N8	Count by tens to 90.	45-46
2	N9	Count by ones to 35.	47-48
3	N10	Recognize and write numerals to 99.	49-50
4	N11	Relate counting to adding and subtracting one.	51-52
5	N12	Order numbers to 100.	53-54
6	N13	Count by tens to 100.	55-56
7	N14	Group objects in tens.	57-58
8	N15	Compare numbers to 100.	59-60
9	N16	Identify ordinals, dates of the month, and days of the week.	61-62
10	N17	Round to the nearest ten.	63-64
11	M2	Exchange ten dimes for one dollar.	65
Test		Numeration	66

Vocabulary

tens
ones
dimes
table form
count forward
one less
ten more
one hundred
after
less than
greatest
in order
1st ... 10th
calendar
tens place
ones place
pennies
100 chart
count back
trade
ten less
before
between
greater than
least
first ... tenth
days of the week
nearest ten

Printed Directions:

Write the numeral.
Count by tens.
Check the dimes.
Save one more cent each day ... month.
Add one more at each step.
Start with ...
Take away ...
What comes after? ... before? ... between?
Which is greater?
Pick the greatest ... least.
Unlock the safe.
Connect in order.
Circle the nearest 10¢ store.
Round to the nearest dime.

Materials

Place-value number blocks:

A rod is 10. ▭▭▭▭▭▭▭▭▭▭ A cube is 1. □

Play money: dollars, dimes, and pennies

Price tag cards: 1¢ to 100¢ or $1.00

Numeral Cards: 1 ... 100

Number line to 100: 1 2 3 ... 98 99 100

Table form cards:

tens 1 to tens 9 and ones 1 to ones 9

Chart paper
Marker pens
Pencils
Crayons
Scissors
Tape

Hundred Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Tens and Ones Cards

0 ones	5 ones	0 tens	5 tens
1 one	6 ones	1 ten	6 tens
2 ones	7 ones	2 tens	7 tens
3 ones	8 ones	3 tens	8 tens
4 ones	9 ones	4 tens	9 tens

About This Unit

This unit extends and deepens the student's understanding of the numeration concepts initiated in Unit 1, specifically focusing on numeration to 100. The numeration concepts of place value, counting, comparing, grouping, and trading are absolutely fundamental in arithmetic. The student's text, although quite thorough in its treatment of numbers to 100, must be enhanced with a broader approach including concrete materials, active experience, and discussion.

The manipulative materials suggested for instruction and practice were carefully chosen to be meaningful, relevant, easily managed, and successful. Wooden or cardboard base ten number blocks (rod = 10, cube = 1) are particularly effective and versatile. Number blocks are **measurement models** for numerals. In most sets of number blocks the rod is 10 cm long and the cube is 1 cm long.



rod cube

Place-value tokens or coins (dime = 10, penny = 1) are more abstract than number blocks, but are equally effective, quite relevant, and motivating. The *Houghton Mifflin Mathematics* developmental sequence for money concepts and skills parallels its treatment of numeration concepts and skills. Hence, the place-value tokens of penny, dime, and dollar are extensively discussed prior to the introduction of nickels and quarters in Unit 7.



At the teacher's discretion, other place-value materials may replace the use of number blocks and coins if the following cautions are heeded.

1. That the skills for dimes and pennies intrinsically developed in Unit 3 not be omitted.
2. That the models adopted (e.g., Unifix) be associated with pictures or sample sets of number blocks and money as a bridge to the pictorial references in the workbook.

Counting columns, prescribed in Lessons 2 and 4, are particularly useful for developing counting patterns and for relating counting to addition and subtraction. Manipulative experiences and simple recording should precede and also follow the assignment of workbook pages. For example, practice with counting (forward and back by ones and tens) needs to be varied and spread over time. Numerous reinforcement and enrichment ideas are contained in the teacher's notes to facilitate a broad approach to numeration.

3 7
3 8
3 9
4 0
4 1
4 2



"To count, add one more to your number. Trade ones for 1 ten, if you can."

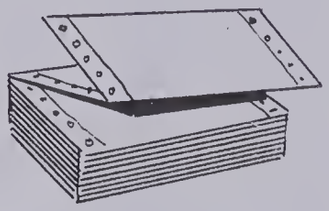
The traditional 100 chart, as useful as ever for discovering number patterns, is incorporated into experiences that actively involve students. Math activities take time; those suggested in Unit 3 are no exception. It is recommended that this unit be covered at a leisurely pace, allowing time for accommodation of the significant numeration concepts and skills. The costs (careful and varied treatment) are small; the rewards (greater understanding and skill) will prove a valuable investment for later topics.

Ideas

1. Unit 3, Numeration to 100, has as its theme *Using money.* Pennies, dimes, and one dollars are introduced as practical models for numeration. In particular, the penny represents 1¢, the dime 10¢, and the dollar 100¢. The illustrations used in the lessons suggest a wide set of experiences, activities, and discussions involving money. The following chart also suggests several activities with money for each lesson of this unit.

2. An enjoyable project for students is the construction of a number line (eventually, by Unit 7, to 1000). The number line can be made from adding machine tape or old computer print-out sheets.





A hallway number line can be used in many ways. Several comparison races are discussed in Lesson 5. The number line can be used for skip counting (by two's, three's). Just the work keeping the number line maintained (strips mysteriously disappear) is fun and worthwhile.

3. Before beginning this unit locate a good collection of dot-to-dot puzzles. These can fit many objectives:
 a. counting forward by tens
 b. counting backward by ones
 c. in order from the least to the greatest
 d. problems involving plus and minus one.

4. Follow the advice of Ruff and Oink, mascots for Unit 3, and "Go Slowly". Follow their comical situations in the workbook and teacher's notes.

Lesson	Topics	Extensions
1	counting out dimes, cash registers	Set up a cash register in the Math Centre for counting practice.
2	saving and spending, piggy banks, sales tags	Why do people save? spend? Who uses a piggy bank? a real bank? What is the difference? Provide sales tags for a pricing display.
4	ways of carrying money	How are wallets and purses used? How does the ice-cream man carry money?
6	counting with dimes and pennies	Make change using only dimes and pennies.
7	making money, trading to find how much	Make a list of the ways older students can earn money: lemonade stands, chores, paper routes.
8	comparing amounts, keeping money safe	Compare the prices of common foods brought in by students. Discuss how to keep money safe.
10	shopping, comparing prices, sale prices	With several parent helpers organize a field trip to the nearest store. Organize a price scavenger hunt. Have the students interview the workers in the store.
11	counting to one dollar, grocery stores	Supply your Math Centre with grocery counters.

Name _____

Pretest **Unit 3**

How many?

tens	ones
6	8

68

5 tens 15 ones

65



36

ones	tens
9	1

19

Write the missing numerals.

27 28 29 | 48 49 50 | 80 81 82 | 11 12 13 | 89 90 91

Keep counting.

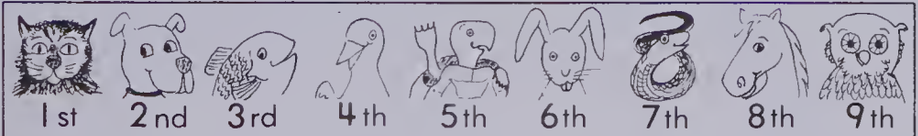
72	73	74	75	76	77	78	79	80
7	17	27	37	47	57	67	77	87
86	76	66	56	46	36	26	16	6

Which is greater?

(72)	or 38	26	or (85)
(44)	or 37	(90)	or 80

Circle the nearest 10.

40 46 (50) | (80) 81 90



The fish is 3rd.

The snake is 7th.

The turtle is 5th.

The owl is 9th.

Name _____

Post-test **Unit 3**

How many?

tens	ones
3	2

32



43

4 tens 12 ones

52

ones	tens
3	8

83

Write the missing numerals.

34 35 36 | 28 29 30 | 60 61 62 | 52 53 54 | 88 89 90

Keeping counting.

65	64	63	62	61	60	59	58	57
3	13	23	33	43	53	63	73	83
94	84	74	64	54	44	34	24	14

Circle the greatest number.

10 9 (13)	15 (19) 12	35 32 (40)
(51) 49 50	90 (100) 99	(83) 38 59

Circle the nearest 10.

(50) 52 60 | 10 17 (20) | 30 36 (40) | (90) 94 100

A	B	C	D	E	F	G	H	I	J

The 2nd letter is B.

The 3rd letter is C.

The 10th letter is J.

The 8th letter is H.

UNIT 3 LESSON 1

Objective N8

Count by tens to 90.

Vocabulary

Ones, tens, count by tens, cents, pennies, dimes, equals

Direction words:
Write the numeral.
Count by tens.
Check the dimes.

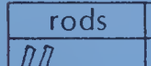
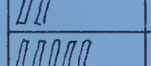
Materials

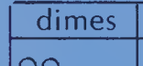
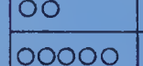
Dimes and pennies, number blocks
Felt markers
Lined chart paper

Introducing the Lesson

Write on the chart paper: 1 ten = 10, 2 tens = 20, 3 tens = 30, ... 9 tens = 90. Count dimes orally by tens using the list on the chart paper. Without the dimes, cover portions of the list and repeat counting by tens until mastery is assured.

With number blocks and coins discuss the place value of the digits in the numerals 20, 50, and 90.

rods	cubes
	
	
	

dimes	pennies
	
	
	

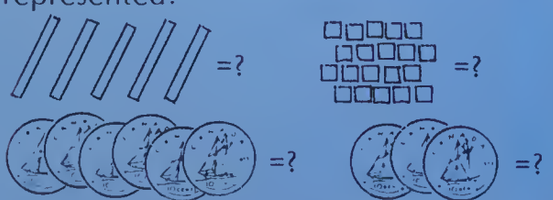
tens	ones
2	0
5	0
9	0

Teaching the Lesson

Have the students use number blocks to show that 10 ones can be traded for 1 ten. Demonstrate that 20 ones are equal to 2 tens.

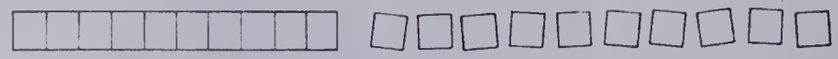


Ask the students to name the number represented.

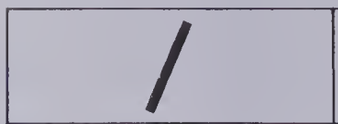
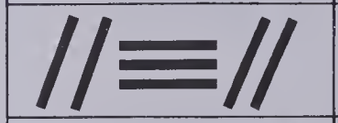


UNIT 3 Name _____

1 ten = 10 ones



Write the numeral.

	1 ten	10
	2 tens	20
	3 tens	30
	4 tens	40
	5 tens	50
	6 tens	60
	7 tens	70
	8 tens	80
	9 tens	90

Count by tens

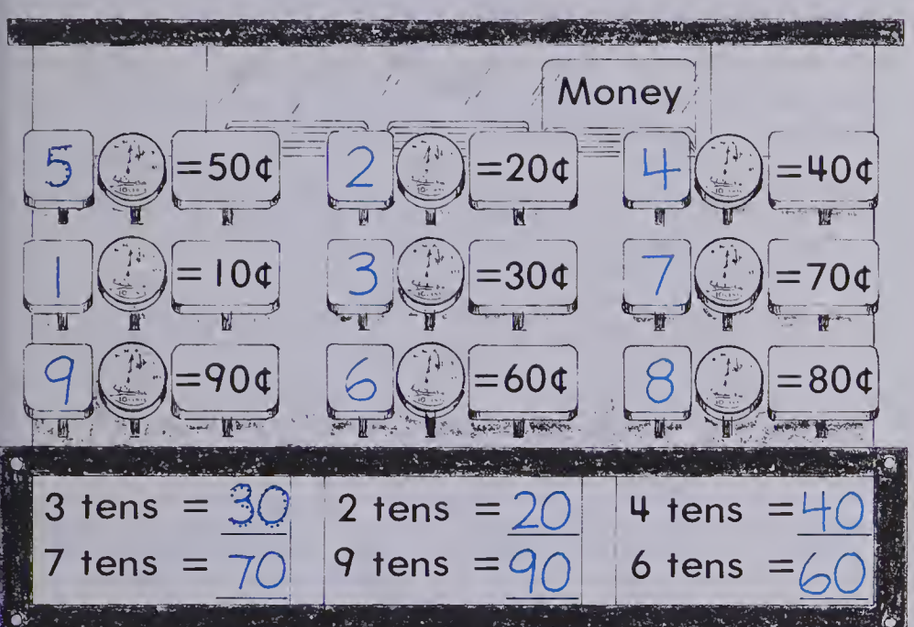
forty-five 45

Using the Pages

- Read and discuss the directions on page 45. Supply rods and cubes to the students who need them. Work a few examples together.
- The top of page 46 requires the student to count by tens and then check the coins at the right to show the amount of money written. Work some of the examples at the bottom of page 46 together. Some students may need dimes or rods for counting by tens.

Count by tens. Check the dimes.

10 ¢	
20 ¢	
30 ¢	
40 ¢	
50 ¢	



3 tens = 30	2 tens = 20	4 tens = 40
7 tens = 70	9 tens = 90	6 tens = 60

Extra Practice **Worksheet N8**
Pages 45-46

Count by tens.

0, 10, 20, 30, 40, 50, 60, 70, 80, 90

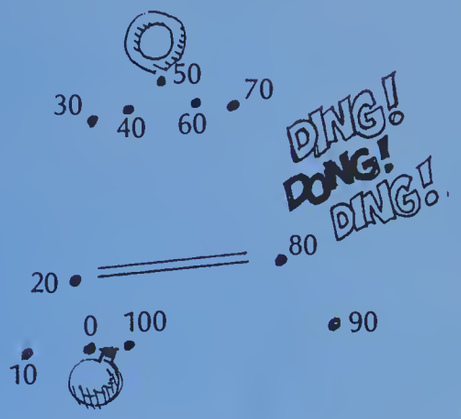
Write the numeral.

3 dimes = 30¢	5 dimes = 50¢	7 dimes = 70¢
2 dimes = 20¢	9 dimes = 90¢	1 dime = 10¢

30¢ = 3 dimes 0 pennies	50¢ = 4 dimes 10 pennies
30¢ = 2 dimes 10 pennies	50¢ = 3 dimes 20 pennies
30¢ = 1 dime 20 pennies	50¢ = 2 dimes 30 pennies
30¢ = 0 dimes 30 pennies	50¢ = 1 dime 40 pennies
	50¢ = 0 dimes 50 pennies

Reinforcement

1. Prepare this counting by tens dot-to-dot puzzle.

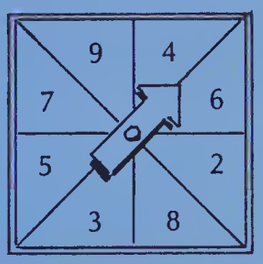


2. Prepare money work cards based on or cut out from catalogs for further trading practice. Provide a supply of dimes and pennies. Let pairs of students practise buying and selling.



Enrichment

1. Play a trading game. Provide a spinner or die. Each student receives 20 pennies and 10 dimes. In turn, the players use the spinner to determine the number of pennies to collect. When ten or more pennies are gathered, a player must trade 10 pennies for 1 dime. Play continues until someone earns 5 dimes.



2. Prepare matching cards for practice with number words.



UNIT 3 LESSON 2

Objective N9

Count by ones to 35.

Vocabulary

Add one more, counting on, trade in tens, ones, Sunday, Monday, Tuesday, ... Saturday, September, October, November, December

Direction words:
Save one more cent each day.
Save one more cent each month.

Materials

Pennies, dimes
Piggy-bank chart

Introducing the Lesson

Discuss the reasons for saving money. Describe the idea of saving regularly. Explain that today's activity is about saving one cent each day.

Teaching the Lesson

Have a piggy bank drawn on chart paper. Place it on the wall. State the rule that the piggy bank will not save more than nine pennies. (It can't stomach more than 9 pennies.) When ten pennies are saved it promptly trades them for one dime.

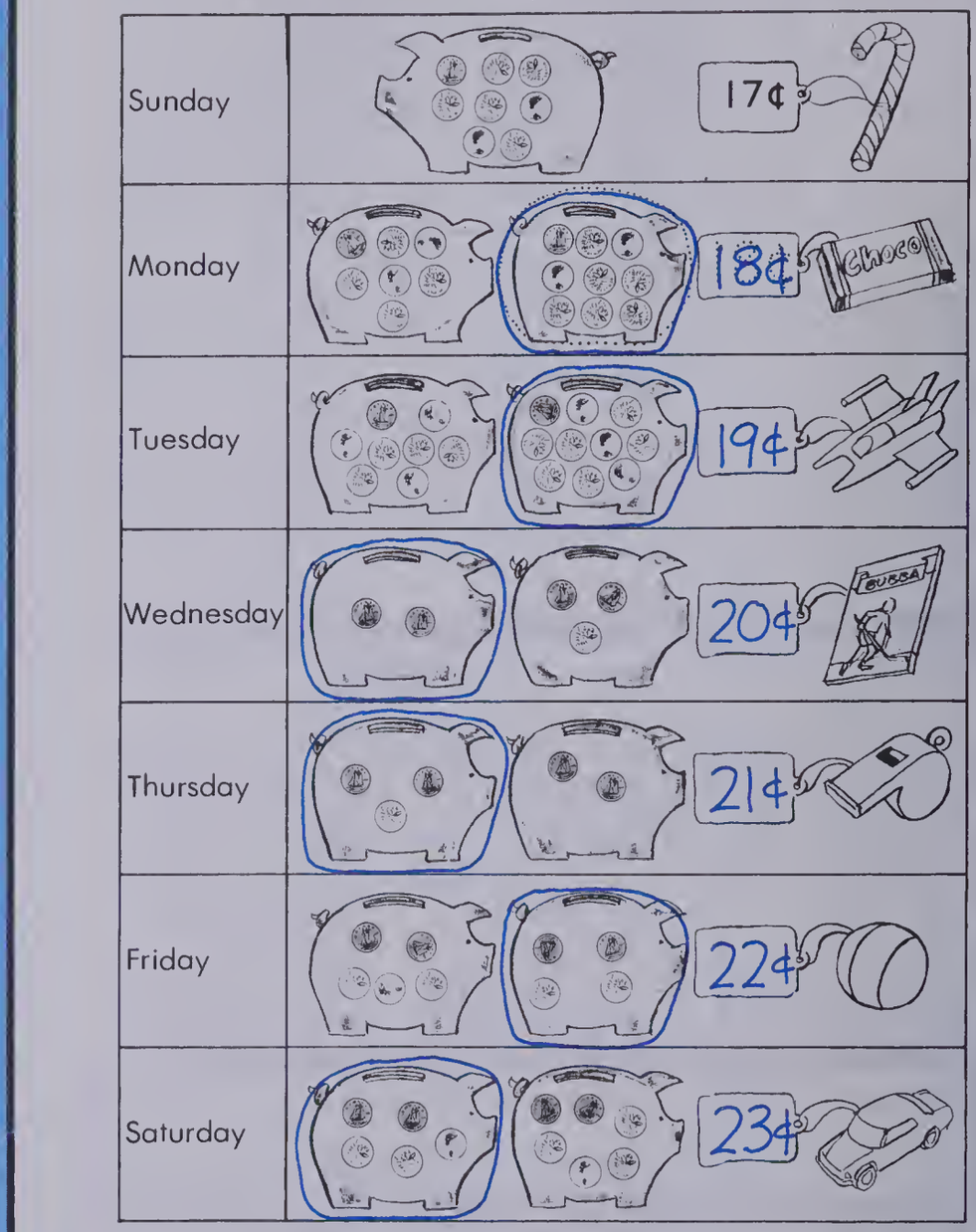
Jan's Savings

Sunday	17¢	24¢	31¢
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			

Explain that it is Sunday and Jan has saved 17¢ so far. Ask someone to show 17¢ with dimes and pennies. Point out that Jan wants to save one more penny each day. Proceed as follows:

a. Read the day. **b.** Add one more penny to the bank. **c.** Trade 10 pennies for 1 dime, if necessary. **d.** Record the savings in the columns. (At this step stress counting on from 20 and from 30.)

Repeat the process until 35¢ is reached.



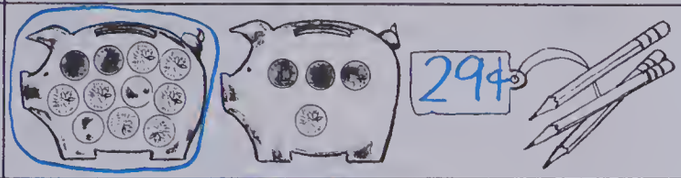
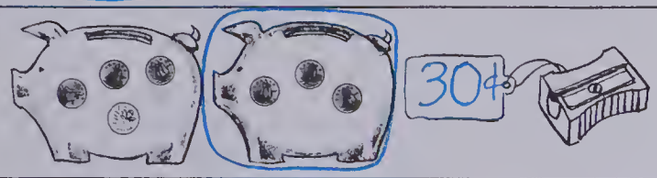
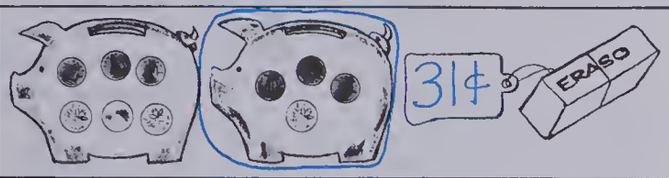
Count to 35

forty-seven 47

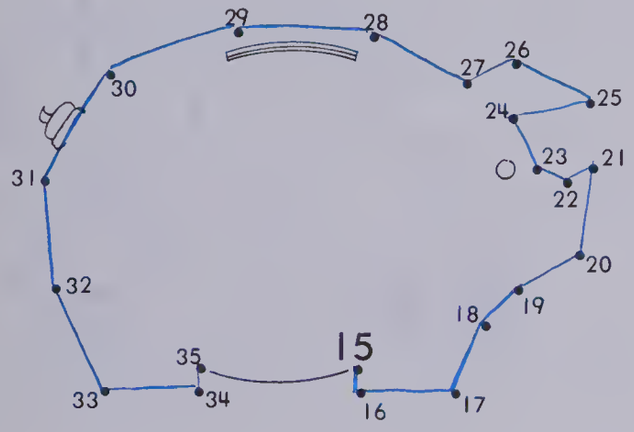
Using the Pages

- For pages 47 and 48 the best approach is to have the students manipulate coins as during instruction. At each step, the answer is recorded in two ways: **1.** by circling the correct bank, **2.** by printing the number of cents on the price tag. The items for sale may be decorated by the students.

Save one more cent each month.

September	
October	
November	
December	

Count from 15 to 35.



Count to 35

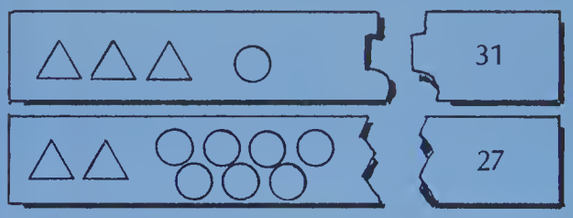
Extra Practice **Worksheet N9**
Pages 47-48

△ is 10. ○ is 1.

△△ 21 22 23 24 25 ○○○○○ = 25	△△△○○○○ = 34
△△○○○○ = 26	△△△○○○ = 33
△△○○○○ = 28	△△△○○ = 32
△△○○○○○ = 30	△△△○ = 31
	△△△ = 30

Reinforcement

1. Prepare a set of matching puzzles. Explain that △ means 10 and ○ means 1.



2. Ask the students to fill in the missing numbers.

1	2			5
	7	8		
11			14	
		18		
	22		24	
			29	
	32			

3. Place three jars on a table. Fill each with a different number of beans (not more than 35). Ask the students to first guess how many beans are in the jar and then count them aloud.

Enrichment

1. Prepare a chart showing the numbers from 1 to 40. Encourage the use of this chart by the students as they count by tens, fives, twos, and fours.

2. Make a store-front mural. Ask the students to design advertisements for the store window by drawing pictures of the items for sale and writing their prices. When complete, coins or coin stamps can be used to indicate the money paid for each item.

UNIT 3 LESSON 3

Objective N10

Recognize and write numerals to 99.

Vocabulary

Tens, ones, count on, tens place, ones, place, table form, patterns

Materials

Number blocks
Table form cards

ones
2

tens
4

Introducing the Lesson

Review counting by ones and tens with place-value number blocks. Show 5 cubes. Ask someone to count them aloud. *One, two, three, four, five.* Show 8 rods for someone to count. *Ten, twenty, ... eighty.*

Teaching the Lesson

Display 4 rods and 3 cubes. Ask how many cubes are there in all. Recall that each rod represents 10 cubes. Have someone count the rods by tens and then *count on* by ones to find the total number of cubes.

Ten, twenty, thirty, forty,
forty-one, forty-two, forty-three.

Record the result in table form.

rods	cubes
4	3

OR

tens	ones
4	3

4 tens 3 ones or 43

Give the students similar practice in counting on with rods and cubes from models of the numbers 25, 86, 69, and 77.

Show these table form cards.

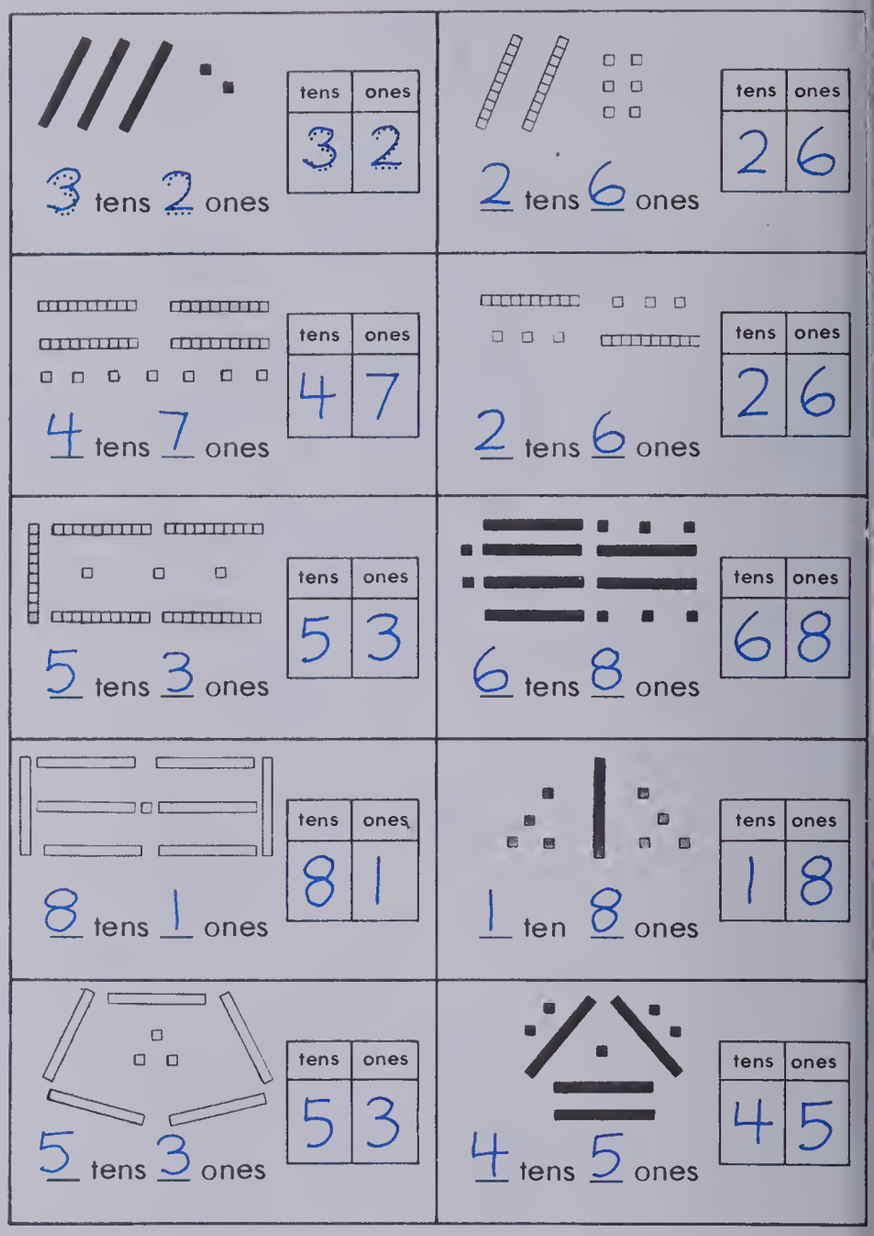
ones
4

tens
3

Ask the students to model 4 ones and 3 tens with rods and cubes. Have them determine the standard number the blocks and form cards represent. As it is decided that the number is 34, explain the terms *tens place* and *ones place*.

Name _____

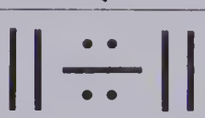
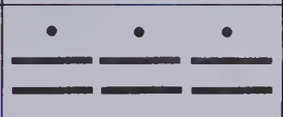
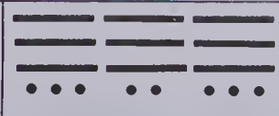
How many?



Using the Pages

- On page 49 the students must write the number of tens and ones in table form and place name form. Point out that ▮, ▯, and ▯ are pictures for ten, and □ and ■ are pictures for one.
- At the top of page 50, students must write the number in standard form from the geometric designs of rods and cubes. At the bottom of the page, remind the students to count and record the ones first.

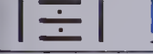
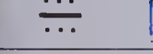
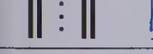
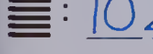
How many? / = ten • = one

 37	 54	 46
 58	 18	 82
 29	 63	 21
 76	 40	 98

 63	ones 2 tens 5 → 52	tens 2 ones 5 → 25	ones 4 tens 9 → 94	ones 0 tens 8 → 80
tens 3 ones 9 → 39	tens 1 ones 5 → 15	ones 1 tens 7 → 71	 46	tens 5 ones 7 → 57

Extra Practice **Worksheet N10**
Pages 49-50

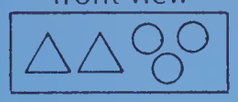
Count.

	10 20 30 31 32 33 34	3 tens	4 ones
	10 20 21 22 23 24 25	2 tens	5 ones
	10 20 30 40 50 51 52	5 tens	2 ones
	10 11 12 13 14 15 16	1 tens	6 ones
	10 20 30 40 50 60 61	6 tens	1 ones
	10 20 30 40 41 42 43	4 tens	3 ones
	10 20 30 40 41 42 43 44	4 tens	4 ones
	10 20 30 40 50 60 61 62	6 tens	2 ones

Reinforcement

1. Prepare numeration flash cards using the following symbols for 10 and 1 respectively: 



front view  back view: 2 tens 3 ones = 23

Have the students invent their own pictures for ten and one. Allow each to devise a small worksheet on place value for a classmate.

2. Play the Table Form Game. You need a 100 chart and a different coloured marker for each player. Shuffle a complete set of table form cards. Cut the deck into two face-down piles. In turn, each player turns up a card from each pile. Three situations may occur:

1. If two ones or two tens appear, the turn is lost.
2. If a ones card and a tens card appear, the number is marked on the 100 chart with the player's colour and another number pair is drawn.
3. If a tens card and ones card appear, the number showing **and** one other number of the player's choice are marked and another draw is taken. Play continues until 50 numbers on the 100 chart are marked. Players must tally their marks to determine the winner.

Enrichment

1. Have the students investigate geometric aspects of number block designs (vertical and horizontal symmetry). Provide "rods" and "cubes" made of coloured construction paper. Ask the students to make designs. After they are displayed in the classroom, discuss their geometric aspects.

2. Encourage the students to make repeating patterns from number blocks.



Repeating patterns can also be produced with coloured beads, with letters, with geometric shapes, with rhythmic clapping, and with percussion instruments.

UNIT 3 LESSON 4

Objective N11

Relate counting to adding and subtracting one.

Vocabulary

Add one, one more, count forward, subtract one, one less, count back, trade

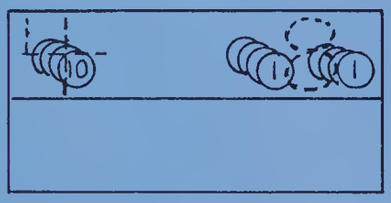
Direction words:
Add one more at each step.
Start with ...
Take away ...

Materials

Number blocks
Pennies and dimes
Counting columns on chart paper

Introducing the Lesson

Have the following counting column drawn on chart paper.



Draw four dimes and eight pennies in the first space. Have the students count by tens and count on from 40 to determine that 48¢ should be written in the first box. In the next box, draw 49¢ by adding one more penny. Write 48 + 1 beside the box. The students should determine by using coins or by counting on that 49 is to be written in the second box and as the sum. Continue this process up to 52¢. Discuss carefully the trading of 10 pennies for 1 dime that occurs at 50.

Teaching the Lesson

Use a counting column and number blocks on an overhead projector to count back from 33 to 27. At each step slide the blocks to the next box and take away one cube.

Discuss carefully the trading of 1 rod for 10 cubes that occurs before 29. Read the numbers 33, 32, 31, 30, 29, 28, 27. Lead the students to conclude that counting back is closely related to subtracting one.

Name _____

Add **one more** at each step.

57	87	78	68
58	88	79	69
59	89	80	70
60	90	81	71
61	91	82	72
62	92	83	73

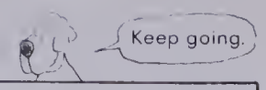
Add one.

57 + 1 = 58	58 + 1 = 59	59 + 1 = 60	60 + 1 = 61	28 + 1 = 29	29 + 1 = 30
78 + 1 = 79	79 + 1 = 80	80 + 1 = 81	81 + 1 = 82	48 + 1 = 49	49 + 1 = 50
39 + 1 = 40	40 + 1 = 41	41 + 1 = 42	42 + 1 = 43	88 + 1 = 89	89 + 1 = 90

Using the Pages

- Discuss the illustrations at the top of pages 51 and 52. Have the students use their coins or number blocks to complete the pages. The use of materials is absolutely essential for relating the concept of counting to adding one, subtracting one, and trading.

Start with . Take away .



23	22	21	20	19	18

43	42	41	40	39	38
82	81	80	79	78	77
78	77	76	75	74	73
64	63	62	61	60	59
71	70	69	68	67	66
93	92	91	90	89	88
50	49	48	47	46	45
37	36	35	34	33	32

Extra Practice **Worksheet N11**

Pages 51-52

Add one.

35 + 1 = 36 38 + 1 = 39 39 + 1 = 40 40 + 1 = 41

50 + 1 = 51 53 + 1 = 54 59 + 1 = 60 60 + 1 = 61

Count **forward** by ones.

53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	

Subtract one.

35 − 1 = 34 38 − 1 = 37 39 − 1 = 38 40 − 1 = 39

50 − 1 = 49 53 − 1 = 52 59 − 1 = 58 60 − 1 = 59

Count **back** by ones.

97	96	95	94	93	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78

Reinforcement

1. Draw attention to the page numbers in any textbook. Have the students practice counting forward and back using page numbers.

2. Let the students practise counting forward and backwards using folded paper.

3	6
3	7
3	8

3. Provide the following dot-to-dot puzzle requiring counting back by ones.



Enrichment

Play this memory counting game. Pick a number over 50, say 63. The first player says, "I went to town and bought 63 bones." The second player says, "I went to town and bought 63 bones and 64 panda bears." A player who makes a mistake must drop out. Play continues until all but one of the players has made a mistake.

UNIT 3 LESSON 5

Objective N12

Order numbers to 100.

Vocabulary

Before, between, after, 100, one, hundred, 100 chart

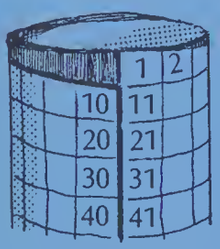
Direction words:
What comes after?
... before?
... between?

Materials

100 chart
Number line to 100
Scissors and tape

Introducing the Lesson

Display the 100 chart. Ask the students to count orally by ones and tens using the chart. Have them compare a 100 chart and a number line to 100. They should note that each has a different shape, yet the same numbers. Challenge anyone to explain how to change the 100 chart into a number line with scissors and just *one* piece of tape. (Note: Cutting the 100 chart into rows and taping uses 9 pieces of tape.)



A Hundred Magic Trick

Match the edges of the chart and tape along the edge from 10 to 100. Begin cutting horizontally at 1 and continue until 100 is reached.

Teaching the Lesson

Ask someone to count orally from 1 to 10. "Which number comes **after** 10?" The student now uses the 100 chart to answer, *eleven*. Have someone count back orally from 40 to 30. "Which number comes **before** 30?" The student uses the 100 chart and answers, *twenty-nine*. Point to 67 and 69 on the 100 chart. "Which number comes *between* these two numbers?" Try several other pairs of numbers for the students to determine what comes between.

Name _____

Count to 100.

0	1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20	
21	22	23	24	25	26	27	28	29	30	
31	32	33	34	35	36	37	38	39	40	
41	42	43	44	45	46	47	48	49	50	
51	52	53	54	55	56	57	58	59	60	
61	62	63	64	65	66	67	68	69	70	
71	72	73	74	75	76	77	78	79	80	
81	82	83	84	85	86	87	88	89	90	
91	92	93	94	95	96	97	98	99	100	

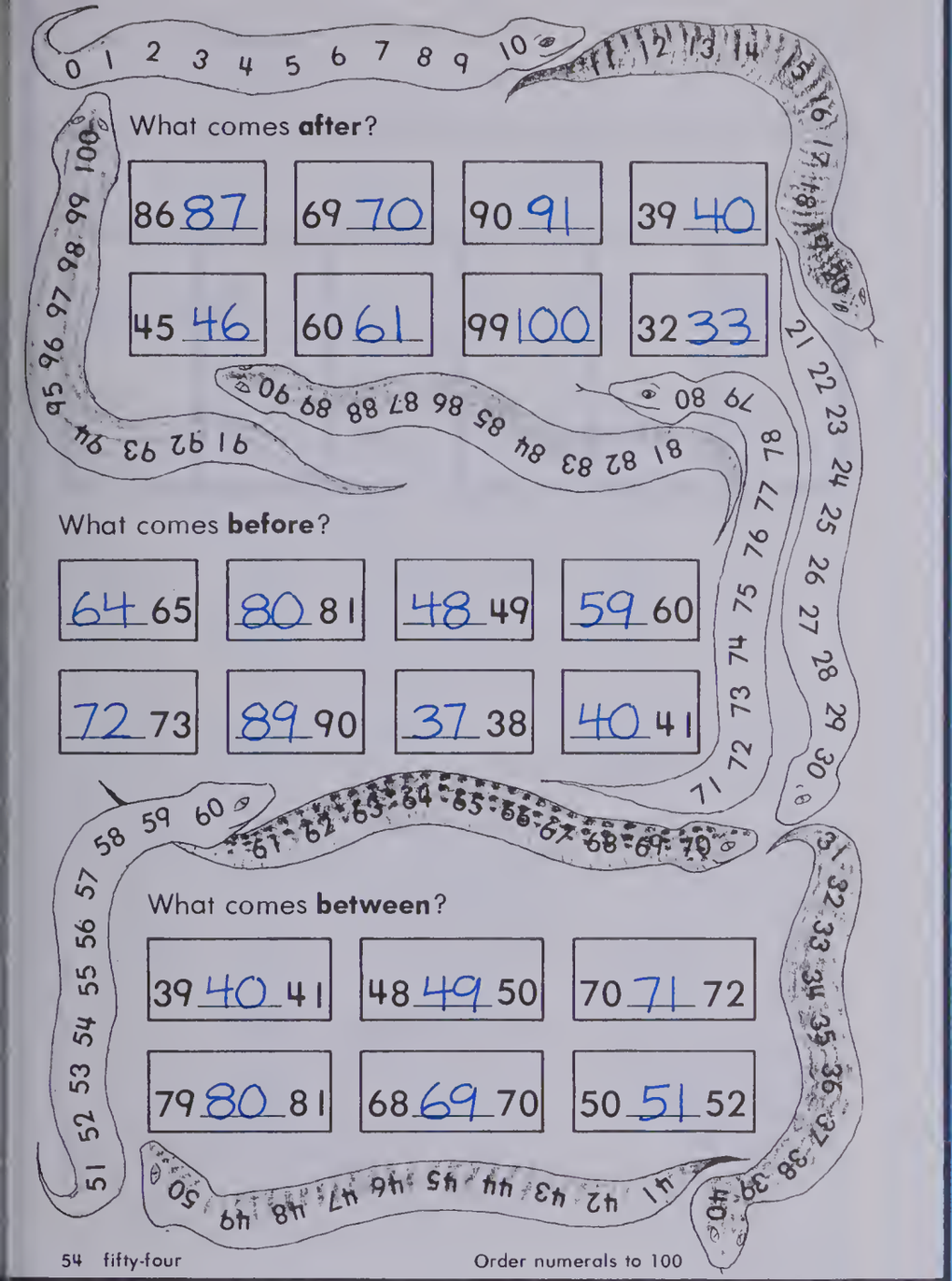


Order numerals to 100

fifty-three 53

Using the Pages

- On page 53, the students are to complete the 100 chart. This chart is designed to be turned into a number line to 100. Refer to the Enrichment section for directions.
- On page 54, show the students how to use the snakes to count to 100 and then to find the numbers *before*, *after*, and *between*.



Extra Practice **Worksheet N12**
Pages 53-54

What comes **after**?

35 36	38 39	39 40	50 51	53 54	59 60

What comes **before**?

50 51	39 40	35 36	59 60	38 39	53 54

What comes **between**?

50 51 52	39 40 41	78 79 80	97 98 99 100

Count from 40 to 63.

40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63

Reinforcement

1. Have students construct a number line to 100. To play the following games, the number line must be taped along the baseboard in the hallway.

Number Line Race I

Give four runners about five index cards each showing different numbers. The first to place the five index cards beside the corresponding numbers on a large number line and return to the starting point is the winner.

Number Line Race II

This game has the same rules as Race I, but varies the representation of the numbers on the index cards.



after 38	3 tens 9 ones	40 + 1

2. Provide a sturdy 100 board made with plywood, hooks, and labelled tags. Have one student interchange 10 numbers and have a second student try to find and correct the mistakes in less than one minute.

Enrichment

1. Have the students use a sturdy 100 board to construct mazes similar to that on page 8 of Unit 1. Allow a student to begin with any number and count forward. After the other numbers have been filled in randomly, the student can challenge anyone to discover the path.

2. Make language cards to ninety-nine and cut them horizontally. Mix the cards. Have the students put them back together.



3. Let the students make their own number lines from the 100 chart on page 53. Have them cut out the 100 chart along the dark border leaving the margin on the left-hand side attached. Then have them curl the chart around so that "10" rests on top of the 10 and "90" rests on top of the 90. Help them to tape along the edge from 10 to 100 and show them how to cut horizontally from 0 to 100.

UNIT 3 LESSON 6

Objective N13

Count by tens to 100.

Vocabulary

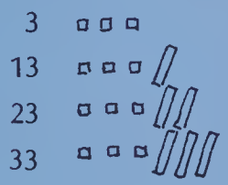
Count forward by tens, ten more, add ten.
Count back by tens, ten less, subtract ten.

Materials

Dimes and pennies, number blocks
Counting columns on chart paper

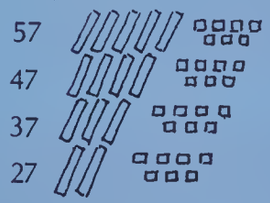
Introducing the Lesson

Using number blocks on an overhead projector count forward by tens from 3 to 93. At each step record the numeral on a counting column chart and then add another ten (or rod). Repeat this procedure starting with numbers 6, 35, and finally 40 until the students notice and describe the number pattern.



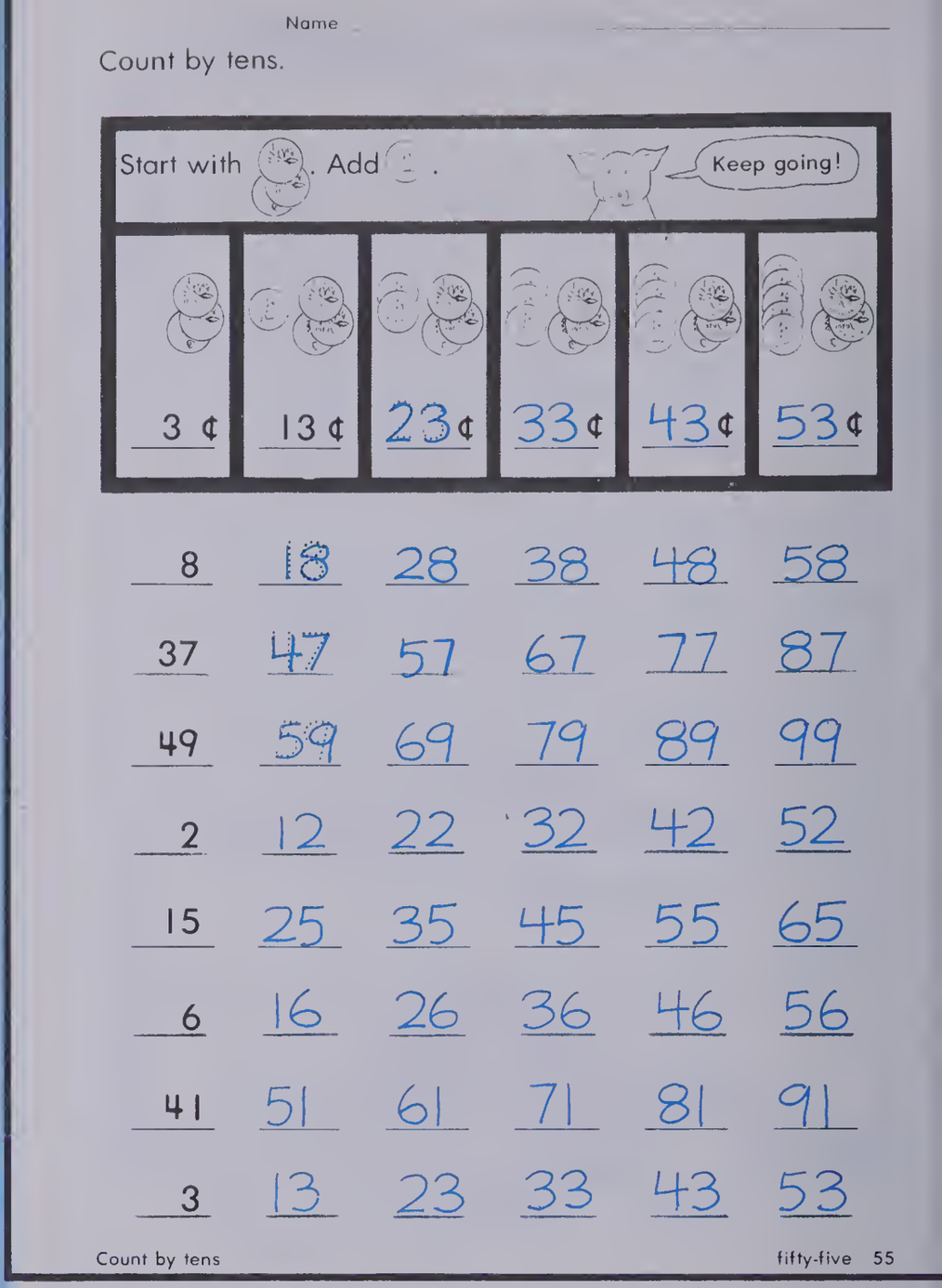
Teaching the Lesson

Using rods and cubes and counting columns, have the students count back by tens from 57 to 7. Repeat the manipulative procedure beginning with other numbers until students can describe the number pattern.



Ask the students to count back by tens from 63 to 23 and from 45 to 5. They are to record the numbers horizontally.

Perform the following problems together using materials: 63 – 10, 53 – 10, 43 – 10, 45 – 10, 35 – 10, 25 – 10. Read the differences. Lead the students to conclude that counting back by tens is related to subtracting 20. (Do not use the standard subtraction algorithm at this time, but a strictly manipulative approach.)



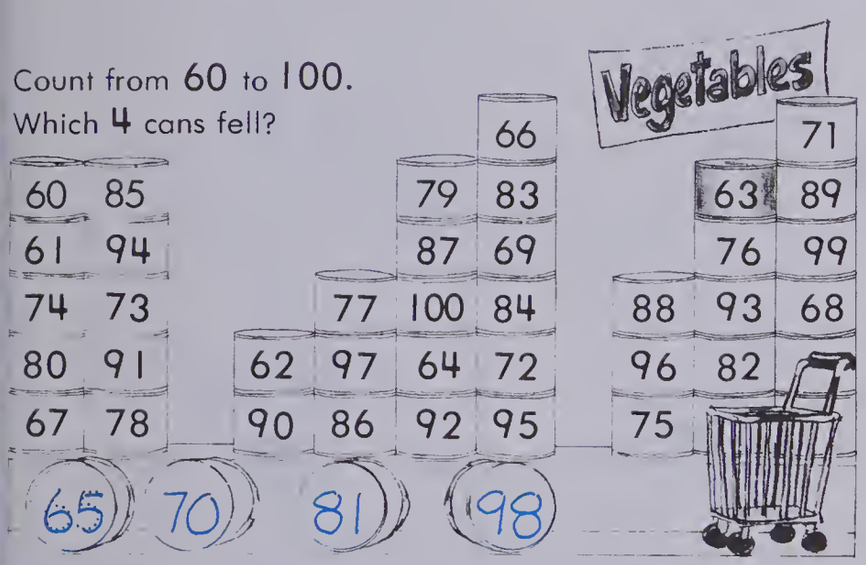
Using the Pages

- Read the directions on page 55 with the students and work the sample problem together. Pass out dimes and pennies for the students to use as they do this page.
- At the top of page 56, students are to count back by ten. At the bottom of the page, all of the numbers from 60 to 100 appear on the cans except four numbers. The students are to determine these missing numbers by counting.

Start with ///// ::: . Take away /.

56	46	36	26	16	6
81	71	61	51	41	31
99	89	79	69	59	49
67	57	47	37	27	17
76	66	56	46	36	27

Count from 60 to 100.
Which 4 cans fell?



Extra Practice
Keep counting by tens.

Worksheet N13
Pages 55-56

2	12	22	32	42	52	62	72	82	92
6	16	26	36	46	56	66	76	86	96
95	85	75	65	55	45	35	25	15	5
93	83	73	63	53	43	33	23	13	3

19 + 10 = 29	54 + 10 = 64	60 + 10 = 70	90 + 10 = 100
19 − 10 = 9	54 − 10 = 44	60 − 10 = 50	90 − 10 = 80
19 + 1 = 20	54 + 1 = 55	60 + 1 = 61	90 + 1 = 91
19 − 1 = 18	54 − 1 = 53	60 − 1 = 59	90 − 1 = 89

Reinforcement

1. Play this "Counting by Tens" game. Cut from construction paper ten coin purses and ten wallets. Number the purses from 0 to 9 and the wallets from 91 to 100. In turn, the player picks a wallet or purse and counts by tens (back for wallets and forward for purses). The wallet or purse is won by the player if the leader with the 100 chart notices no errors.

2. Have the students count forward by tens from 4 to 94 and then count back by tens from 91 to 1 on grid paper. Ask them to cut out each set of numbers one at a time, mix them, and arrange them in order again. When ordered, they can be glued on stiff paper.

Enrichment

Display a 100 chart and point out the usual counting directions with arrows.

a. → = counting forward by ones
b. ← = counting back by ones
c. ↓ = counting forward by tens
d. ↑ = counting back by tens

Explain how 51 → 60 means counting by ones forward from 51 to 60; how 32 ← 28 means count by ones back from 32 to 28; etc. Devise several other arrow counting problems for the students to solve.

7 ↓ 97 92 → 96 96 ↑ 56

Problem Solving Activities

Assign Level 2, Unit 3

UNIT 3 LESSON 7

Objective N14

Group objects in tens.

Vocabulary

Tens, ones, group ten ones, tens place, ones place

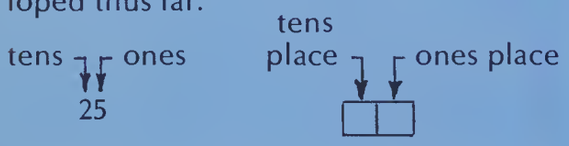
Materials

Dimes and pennies, number blocks

Introducing the Lesson

Recall that ten pennies trade for one dime and ten cubes trade for one rod.

Review the place-value concepts developed thus far.



Using number blocks count forward by ones so that trading (grouping) takes place. Stress that numbers we use for counting cannot have more than nine in either the tens or ones places. Have the students circle the numbers that need to be changed.

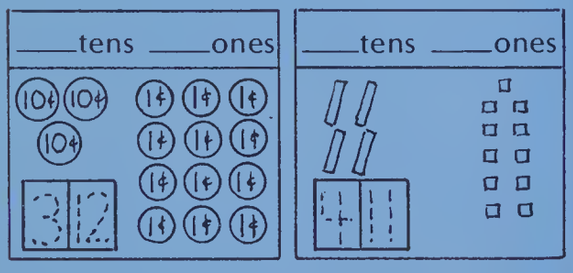
tens	ones
8	10

tens	ones
7	9

tens	ones
0	13

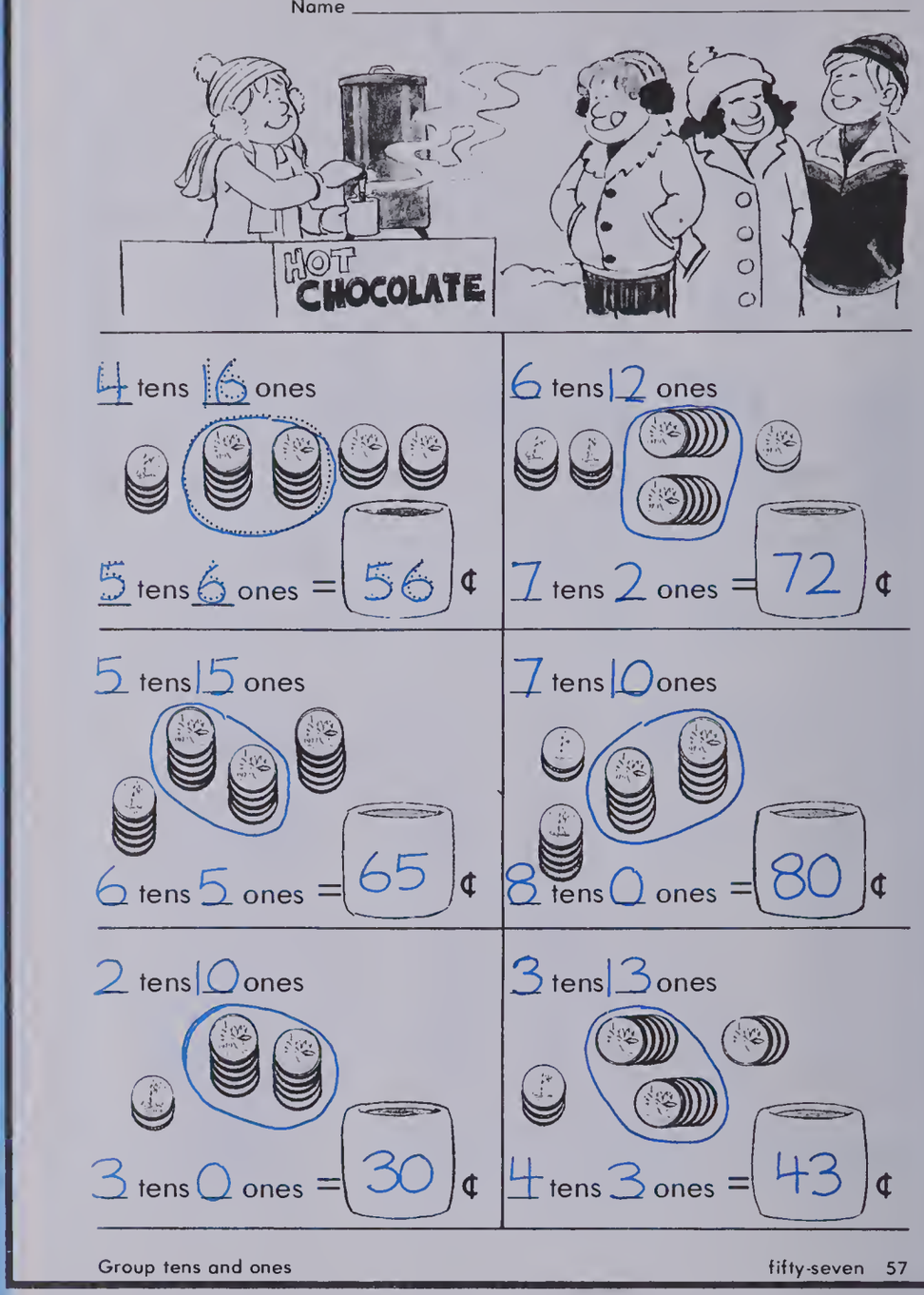
Teaching the Lesson

This lesson will take two days. Display the following examples on the chalkboard using money and number-block drawings.



Ask the students to do the following steps for each.

1. Count and record the number of ones. **2.** Count and record the number of tens. **3.** Group together 10 ones, if possible. **4.** Note the adjusted number of ones and tens. Relate these to the original numbers. **5.** Then determine the standard number and relate this to the original numbers.

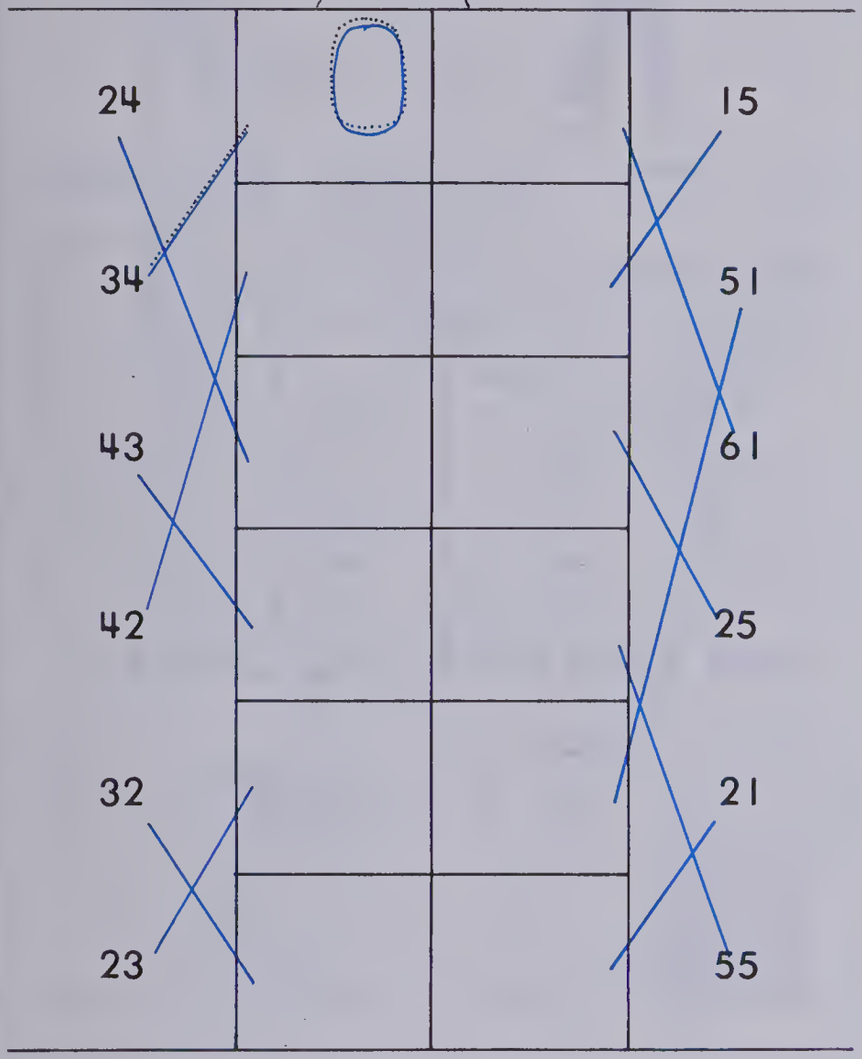


Using the Pages

- Have the students practise several examples similar to those on page 57 with coins before assigning the page. When they can perform the trading confidently, they can attempt the page.
- The students should have rods and cubes as they do the trading steps on page 58. Work a few examples together.

Circle a ten if you can.
Then match.





Extra Practice **Worksheet N14**
Pages 57-58

Circle a ten if you can. Write the numeral.

△ = 10 • = 1

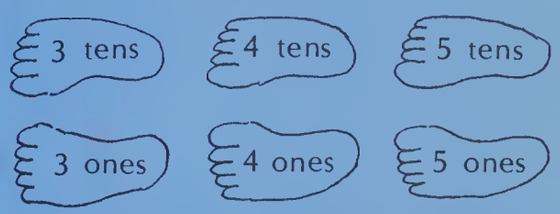
△△△:::: =	38	4 tens 8 ones =	48
△△△::::• =	39	4 tens 9 ones =	49
△△△(::::) =	40	4 tens 10 ones =	50
△△△(:::::•) =	41	4 tens 11 ones =	51
△△△(:::::::) =	42	5 tens 12 ones =	62

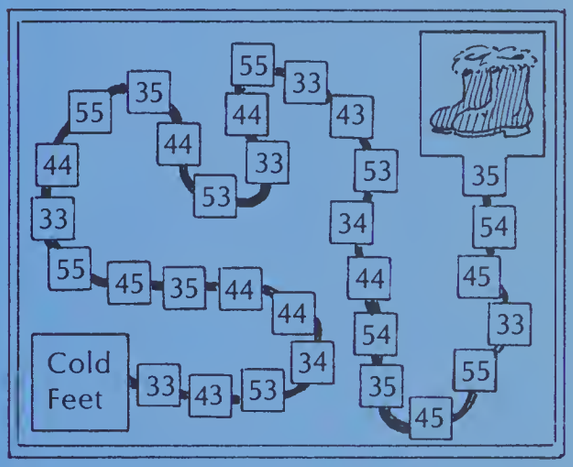
Reinforcement

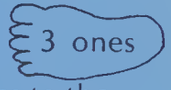
1. Display thematic ten-holders (trees with baubles at Christmas, haunted houses with spooks at Halloween, hearts with arrows at Valentine's Day, etc.) for the students to write the standard number.



2. Play Cold Feet. Prepare five of each of the following cards and one marker per player.





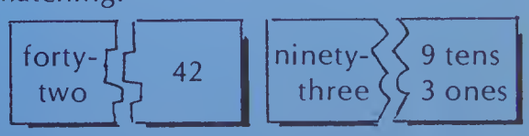
Mix the cards. Each player places his marker in the cold feet square. In turn, players draw cards and move forward as directed. For example, if 

is chosen, the student moves to the next number in the path that has 3 in the ones place. An error results in a lost turn. The first student to the boots' square gets warm feet.

Enrichment

1. Have the students devise and display unusual ten-holders. Allow them to demonstrate the use of ten holders with place-value exercises.

2. Help the students to prepare number-word jigsaw puzzles for matching.



UNIT 3 LESSON 8

Objective N15

Compare numbers to 100.

Vocabulary

Less than, greater than, least, greatest, in order

Direction words:
Which is greater?
Pick the least ... greatest.
Unlock the safe.
Connect in order.

Materials

Dimes and pennies
100 chart
Cards numbered to 100

Introducing the Lesson

This lesson takes two days. Have a student with two front pockets face the other children. Pretend to pull money from both pockets as in the picture on page 59, say 21¢ and 65¢. Discuss which amount is more. Practise the phrases **is less than** and **is greater than**.

Print the following questions on the chalkboard. Ask, "Which is more, seven tens (70) or four tens (40)?" Repeat the question for these pairs.

70 or 40 30 or 50 70 or 90
80 or 60 20 or 100

Teaching the Lesson

Print *least* and *greatest* on the chalkboard. Have a student circle the *least* number and box the *greatest* for each set.

13 (11) [18] 22 19 28 31 43 32 41 39

Mix the cards numbered 0 to 100. Draw and display 10 cards. Have a student find the number which is least and put it on the left, then continue to place the cards in order by finding the least number from each remaining subset.

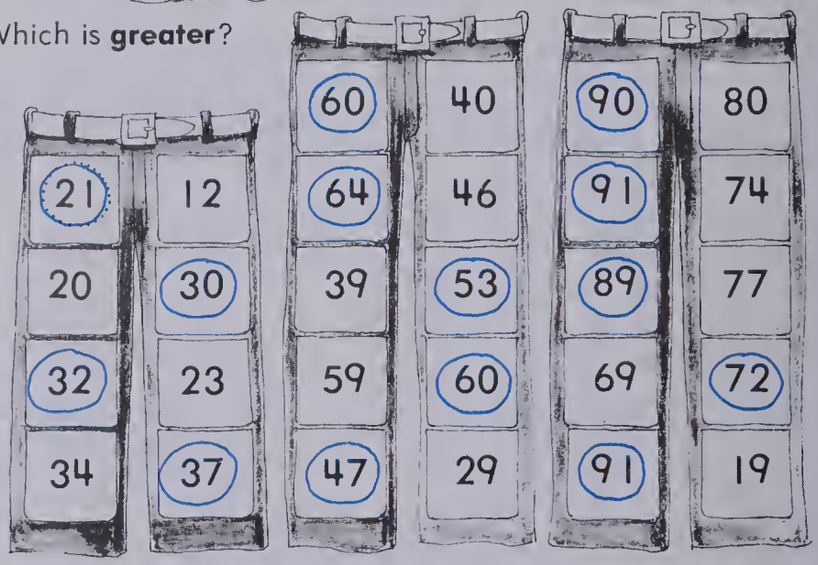
Play the "Speed Sorting Game". A dealer distributes ten cards face down to each player. When the dealer says "Go!" the players place their cards in order as quickly as possible. The first done becomes the next dealer.

Name _____





Which is **greater**?



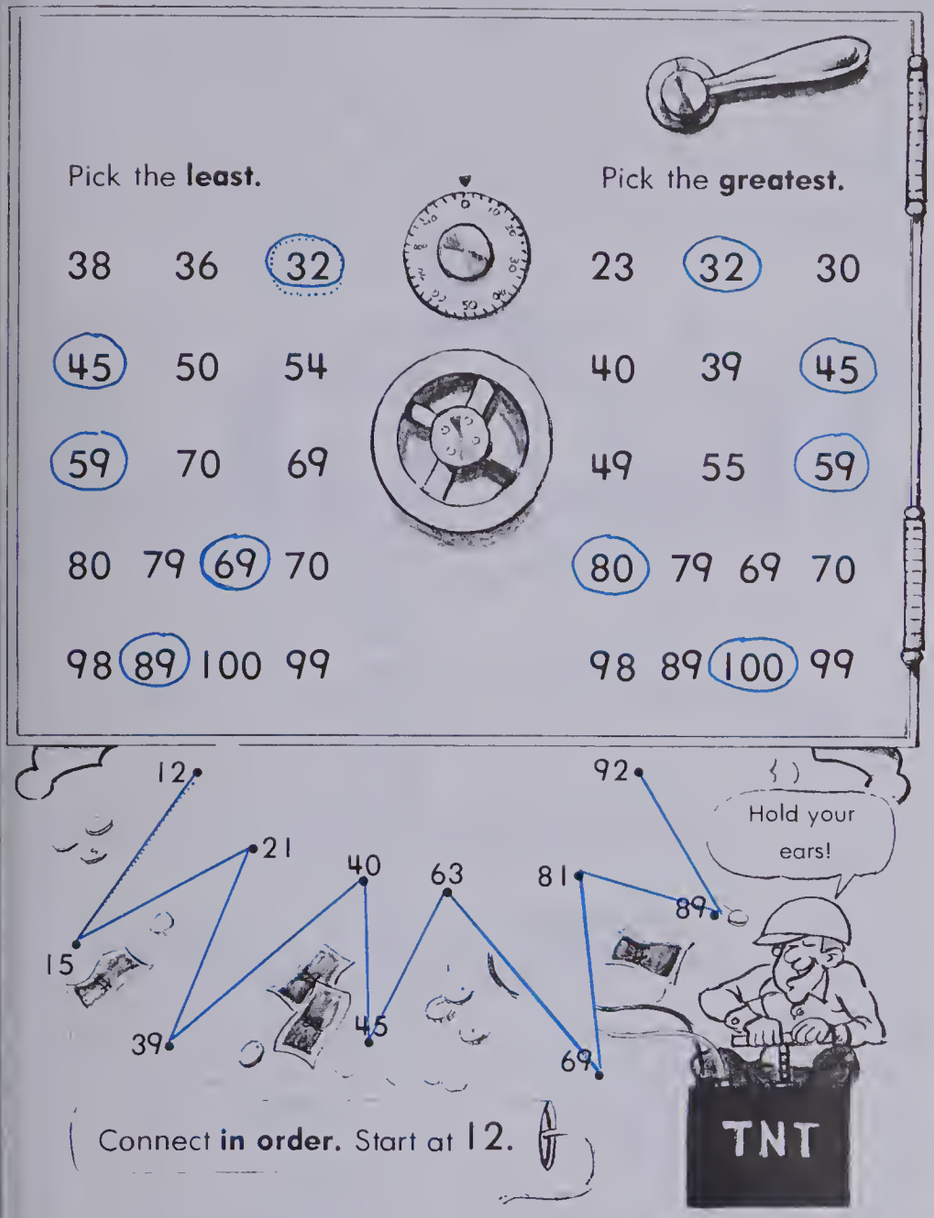
Circle the correct word.

20 is greater / (less) than 30.	80 is (greater) / less than 70.
60 is (greater) / less than 40.	29 is greater / (less) than 31.
82 is (greater) / less than 78.	67 is (greater) / less than 49.

Using the Pages

- Read and discuss the directions on page 59. Work a few examples together.
- Discuss the pictures on page 60. Explain how they can "unlock the safe". Help the students get started with the dot-to-dot at the bottom of the page.

Unlock the safe.



Connect **in order.** Start at 12.

Extra Practice **Worksheet N15**
Pages 59-60

Box the **greatest**. Circle the **least**.

[39] 36 (31)	(58) [72] 67 63	97 88 [98] (79)
(46) [57] 49	[81] 78 (68) 72	[100] 99 95 (89)

Circle the correct word.

32 is (greater / less) than 29.	91 is (greater / less) than 94.
47 is (greater / less) than 51.	66 is (greater / less) than 63.

Write these in order. 69, 54, 32, 45 32 45 54 69.

Reinforcement

1. Play this guessing game. The leader thinks of a number between 1 and 100 (say 52) and records the other players' guesses on a chart of intervals as shown below. After a guess (say 40), the leader must record the appropriate interval within which the number falls (that is, 40-100 instead of 0-40). A guess outside the previous interval is not accepted. Play continues until the number has been guessed.

Guess	Record
	1-100
40	40-100
60	40-60
50	50-60
54	50-54
53	50-53
52	52

6 guesses

2. Provide a target, ten stir sticks, a score-pad, and a strip of tape on the floor and on the wall. In turn, players stand behind the floor tape and lob each of the ten stir sticks so as to bounce them above the wall tape onto the target. The target has areas valued one and ten. The student with the greater score wins.

3. Have the students practise finding specific page numbers in reading texts. This useful skill can be practised almost daily.

Enrichment

1. Relate the ordering of numbers and the ordering of words. The place-value procedure for ordering a set of two-digit numbers (compare the tens digits first) is analogous to the alphabetizing procedure for ordering a set of two-letter words. Have the students practise with these words.

to am do is it fa if on go of ho hi
me pa my in by be so ax we us ox I'm

2. Introduce the symbols < and >. The students can investigate which numbers in the tens place would make the following statements true. Several solutions can be found. Discuss what happens when the tens digits are equal.

□ 4 > □ 7 □ 2 < □ 1 □ 5 < □ 6

UNIT 3 LESSON 9

Objective N16

Identify ordinals, dates of a month, and days of a week.

Vocabulary

Sunday, Monday, ... Saturday, first, second, ... tenth, 1st, 2nd, ... 10th, calendar, ordinal numbers

Materials

Blank month calendar

Introducing the Lesson

Display a blank month calendar. Ask how many days there are in a week. Have someone name them. Talk about the current month. As you discuss the days of the week and dates of the month complete the calendar. Write and then read together the days of the week on the calendar.

Ask the students to find which day is first (fourth, seventh, last, middle, etc.).

Find the first day of the current month and say, "This is the *first* of October." Continue this process until the 10th reached.

Teaching the Lesson

Explain that **ordinal** numbers (first, second, third, ... tenth) are often used in place of the cardinal numbers (one, two, three ... ten) when people are talking about the **order** of something. Use the days of the week and the dates of the month as examples of things which have an order. Show a set of six objects as an example of something which has no particular order.

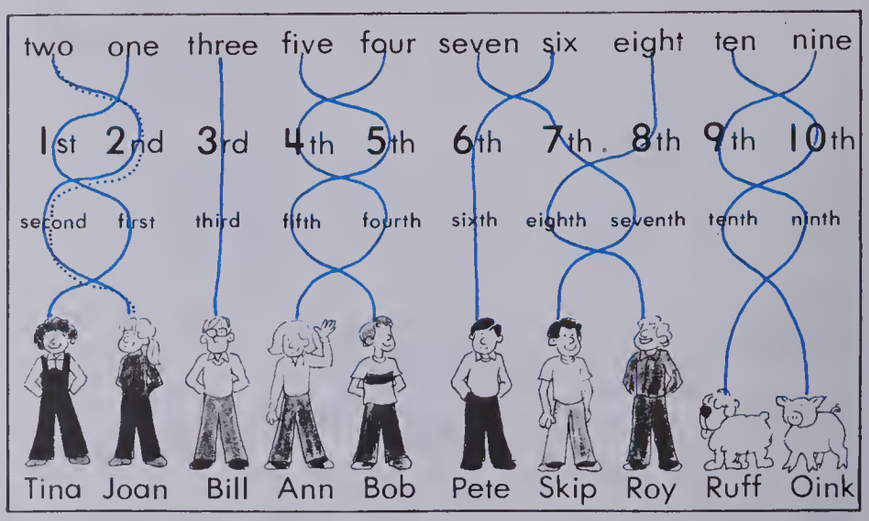
Write the following lists on the chalkboard. Compare the counting and ordinal numbers for each set. Relate the two forms.

1	2	9	10
1st	2nd	9th	10th
first	second	ninth	tenth

Discover that the ordinal number abbreviation combines the cardinal number with the last two letters of the ordinal number words.

Name _____

Match these words and children.



Bill is third.	Joan is second.
Tina is first.	Ruff is ninth.
Skip is seventh.	Ann is fourth.

Ann is fourth.	Joan is second.
Bob is fifth.	Tina is first.
Oink is tenth.	Roy is eighth.

Using the Pages

- On page 61, discuss how the row of children is related to ordinal numbers. Carefully demonstrate several examples. Encourage the students to start at the top row (the cardinal number word) and draw a line to the bottom row (the children).
- Allow the students to copy the month calendar on page 62 from the calendar used during the lesson. Provide crayons so they can follow the colouring directions.

Colour the fourth day of the week blue.

the seventh day	the sixth day	the first day
the second day	the fifth day	the third day

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

19____ 19____

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Extra Practice

Worksheet N16
Pages 61-62

Colour the pig on the third floor blue.

Colour the dog on the second floor yellow.

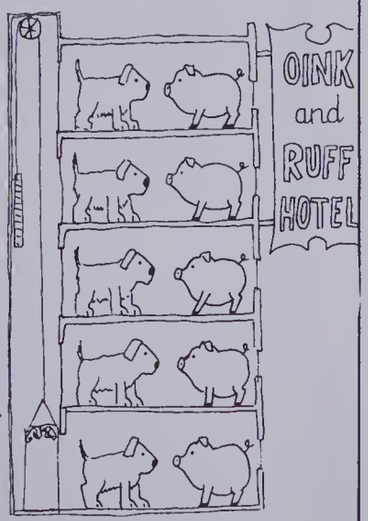
Colour the pig on the fifth floor brown.

Colour the pig on the first floor orange.

Colour the dog on the third floor red.

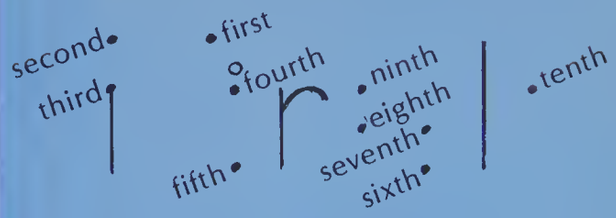
Colour the pig on the fourth floor green.

Colour the dog on the fifth floor black.



Reinforcement

1. Prepare the following dot-to-dot puzzle.



2. Make a sturdy jigsaw puzzle based on the cardinal and ordinal number lists used in the lesson. 2 second

3. Put some of the ordinal number words on the week's spelling list. Have the students include them in their personal dictionaries, too.

4. Refer to ordinal numbers when forming lines of students to go to the library or gym.

Enrichment

1. Have the students unscramble these ordinal numbers and days of the week.

sifrt_____ etthn_____ nscdeo_____
ydanMo____ ydanSu_____ uedTasy____

2. As a class, make a booklet for the poem "Solomon Grundy".

Solomon Grundy
Born on Monday
Christened on Tuesday
Married on Wednesday
Took ill on Thursday
Worse on Friday
Died on Saturday
Buried on Sunday
And that was the end of
Solomon Grundy.

3. Ask the students to study the spelling of ordinals up to 99. Notice the pattern that exists relative to the ordinal numbers.

4. Discuss the nature of year, month, week, and day in more depth. Obtain information from library books and filmstrips.

UNIT 3 LESSON 10

Objective N17

Round to the nearest ten.

Vocabulary

Nearest ten, between, counting forward and back

Direction words:
Circle the nearest 10¢ store.
Round to the nearest dime.

Materials

Boy poster
2 store posters
Price tag cards 1¢ to 99¢

Introducing the Lesson

Draw a toy car and a toy bus on the chalkboard. Explain that the car is selling for 60¢ and the bus for 58¢. Review money, place value, comparison, and one less concepts as you discuss the prices of these two toys.

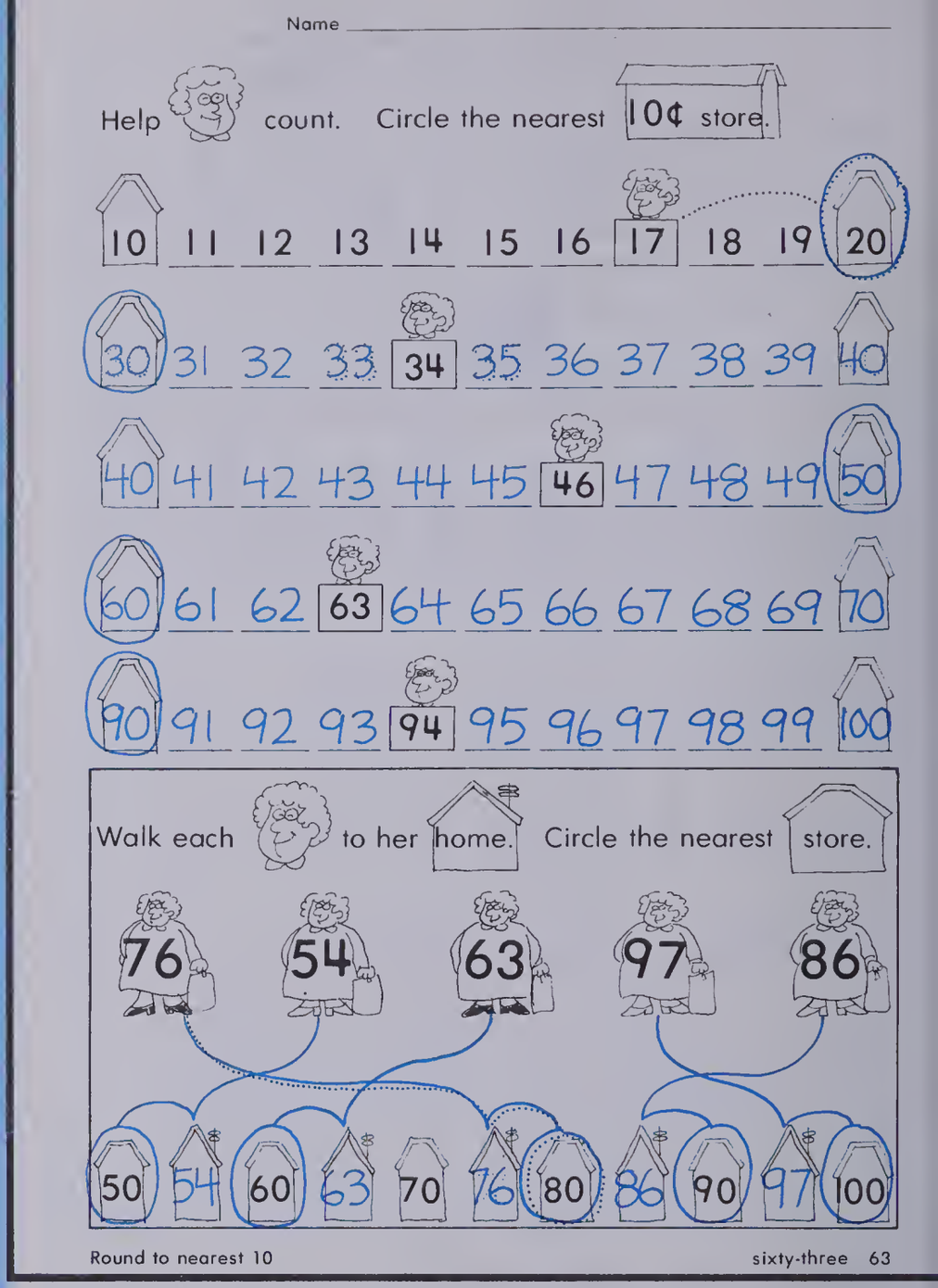
Teaching the Lesson

Draw nine spaces just above the chalk tray and number them 21 to 29. Place the store posters at the ends and number them 20 and 30. Place the boy poster on the twenty-seventh space.

20 21 22 23 24 25 26 27 28 29 30

Explain that the boy wants to go to the store. He lives at 27 and the stores are at 20 and 30. Count back to 20 and forward to 30 from 27. Show and record that there are 7 spaces to 20 and 3 spaces to 30. Lead the students to decide that 27 is closer to 30 than to 20. Repeat the process placing the boy on space 54 between stores at 50 and 60 and the boy on space 85 between stores 80 and 90.

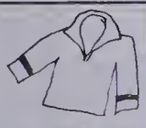
Discover that space eighty-five is equidistant from the stores at 80 and 90. Determine that two-digit numbers with **less than 5** in the ones place are nearer to the lesser 10¢ store and that two-digit numbers with **more than 5** in the ones place are nearer to the greater 10¢ store. Have the students practise choosing the nearest ten using this discovery.



Using the Pages

- Discuss the first example in each section on page 63. The exercises are similar to the activities used in the lesson.
- Read and explain the directions on page 64. Explain that *rounding* to the nearest dime is the same as finding the closest ten.



	How many 10¢'s and 1¢'s?	Round to the nearest dime.
	8 10¢ 1 1¢	80¢
	3 10¢ 9 1¢	40¢
	7 10¢ 3 1¢	70¢
	5 10¢ 2 1¢	50¢
	7 10¢ 0 1¢	70¢
	4 10¢ 9 1¢	50¢

Extra Practice **Worksheet N17**

Pages 63-64

Circle the nearest ten.

20 26 (30)	(30) 34 40	(70) 73 80	80 87 (90)
90 96 (100)	(60) 64 70	(20) 23 30	10 17 (20)
50 56 (60)	(90) 94 100	(10) 13 20	90 97 (100)

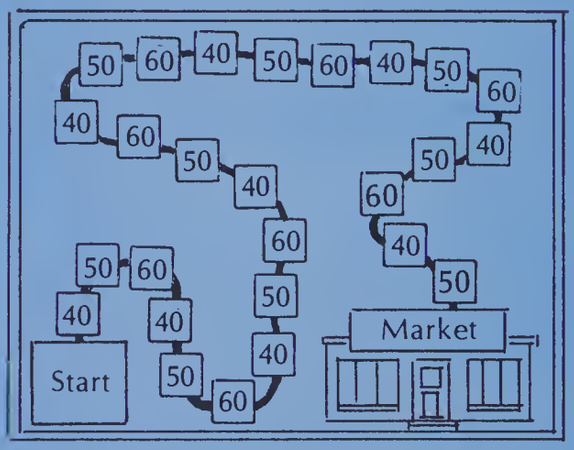
Write the numeral.

50 − 1 = 49	100 − 1 = 99	19 − 1 = 18
61 − 1 = 60	29 − 1 = 28	91 − 1 = 90

23¢ = 2 dimes 3 pennies	84¢ = 8 dimes 4 pennies
62¢ = 6 dimes 2 pennies	19¢ = 1 dimes 9 pennies

Reinforcement

Play "Marker to the Market". Print 40, 40, 50, 50, 60, 60 on the faces of one wooden cube and 2, 3, 4, 6, 7, 8 on the faces of another wooden cube. The object of the game is to get a marker to the market. In turn, each player rolls the two cubes, adds the numbers, rounds the sum off to the nearest ten, and moves forward on the path to the next occurrence of that number.



Enrichment

1. Have the students complete sales coupons. Encourage them to invent comical items for their coupons.

Mr. Jones' Shoe
usually 80¢
10¢ off today.
70¢

2. Discuss how to round off numbers ending with 5 to the nearest ten.

3. Discuss the concept of "sales" in more depth. Determine advantages and disadvantages for the buyer and seller. List examples of current sales in the neighbourhood.

UNIT 3 LESSON 11

Objective M2

Exchange ten dimes for one dollar.

Vocabulary

Dollar, trade, count by tens

Materials

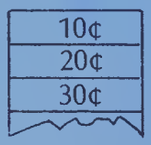
Dimes, pennies, one-dollar bills
Counting columns

Introducing the Lesson

Hold up a dollar bill. Discuss its shape, colour, design, language, etc. Pass around several dollars to facilitate the discussion.

Teaching the Lesson

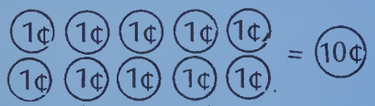
On a counting column count and write using dimes from 10¢ to 90¢. Then write and say, "100¢." Discuss why ten dimes trade evenly for a dollar bill.



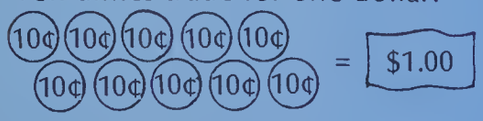
Ask how many pennies can be traded for one dollar. Show that a one-dollar bill is worth 100 pennies with ten piles of ten pennies. Explain that 100¢ is usually written as $1.00 and called **one dollar.**

Compare the trade of ten pennies for one dime to the trade of ten dimes for one dollar.

Ten pennies trade for one dime.

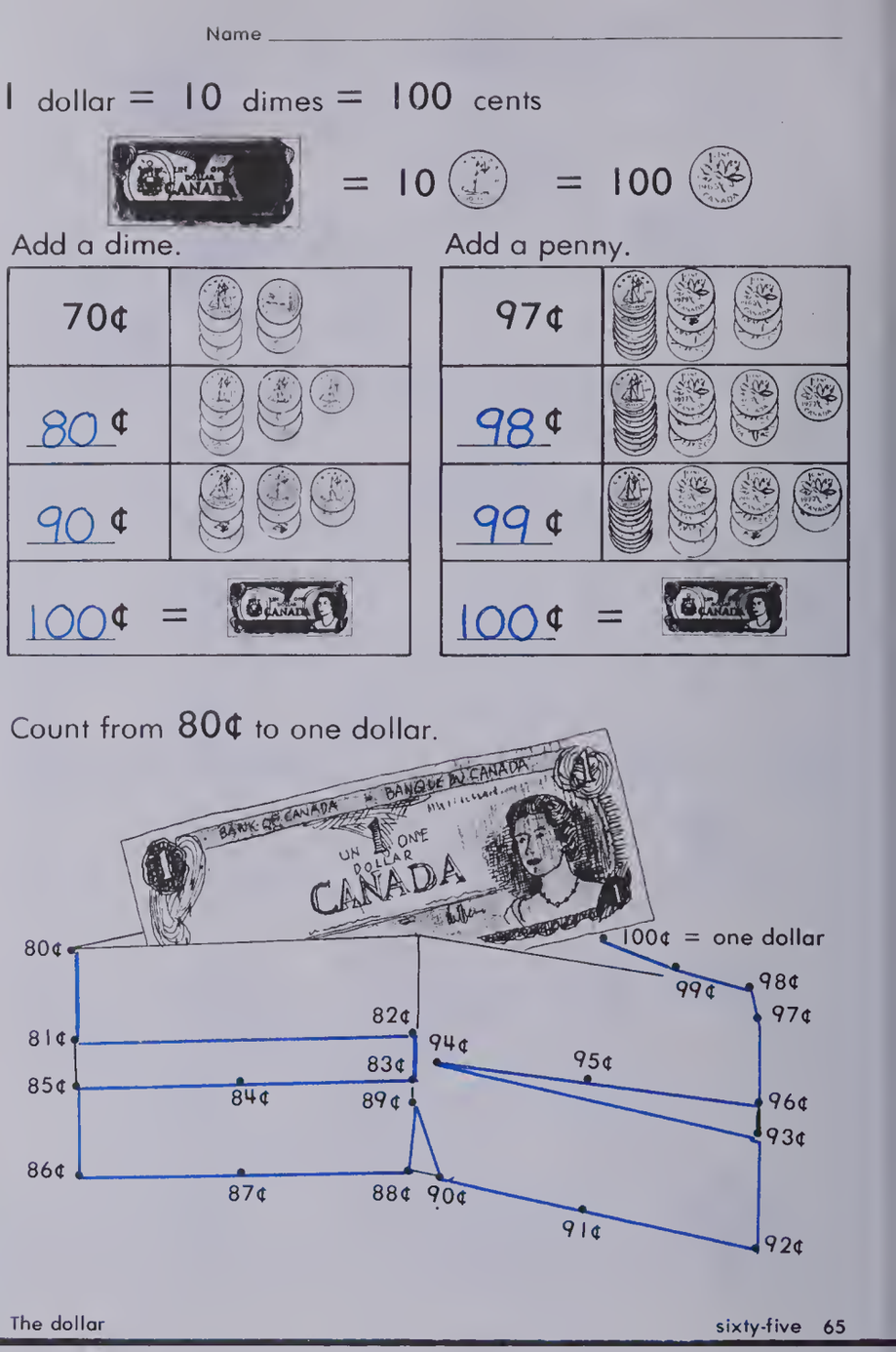


Ten dimes trade for one dollar.



Enrichment

Establish a class store. Provide price tags, place-value tokens (pennies, dimes, dollars), and a cash register. Stock the store with classroom supplies and second-hand books and toys. After an initial allowance, pay the students for a variety of school-wide chores such as picking up litter, arranging gym supplies, etc.

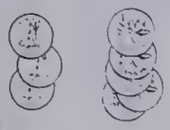


Using the Pages

- At the top of page 65 are two counting columns for the students to complete. The column on the left counts by dimes from 70¢ to $1.00. The column on the right counts by pennies from 97¢ to $1.00. Dimes and pennies for counting should be supplied where needed.
- A straightedge should be provided for the dot-to-dot puzzle at the bottom of the page.

Name _____

How many?



3 tens 5 ones	4 tens 6 ones	9 tens 2 ones	5 tens 0 ones
35¢	46	92	50

tens 9 ones 2



Print the missing numerals.

24 25 26	38 39 40	50 51 52	62 63 64

Keep counting.

75	74	73	72	71	70	69	68	67
6	16	26	36	46	56	66	76	86
92	82	72	62	52	42	32	22	12

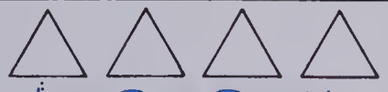
Which is greater?

25 or 80	39 or 51
75 or 59	60 or 40

Circle the nearest 10.

70	73	80	60	67	70

Colour the second △ .
Colour the first △ .
Colour the third △ ● .



1st 2nd 3rd 4th

Extra Practice **Worksheet M2**
Page 65

Count.

50¢	60¢	70¢	80¢	90¢	100¢	30¢	40¢	50¢	60¢	70¢	80¢
95¢	96¢	97¢	98¢	99¢	100¢	47¢	48¢	49¢	50¢	51¢	52¢
18¢	19¢	20¢	21¢	22¢	23¢	24¢	25¢				
26¢	27¢	28¢	29¢	30¢	31¢	32¢	33¢				

How many?

One dollar is 10 dimes.

One dollar is 100 pennies.

One dollar is 100¢.

One dollar is $1.00.

UNIT 3 TEST

Part 1: Writing two-digit numerals.

Part 2: Ordering numbers (before, after, and between).

Part 3: Counting by ones and tens.

Part 4: Determining the greater number and rounding to the nearest ten.

Part 5: Ordinal numbers.

UNIT 4
Addition and Subtraction Facts to 12

Theme: Animals

Lesson		Objective	Pages
1	A10	Add, with sums to ten.	67-68
2	A11	Add, with sums to eleven.	69-70
3	A12	Add, with sums to twelve.	71-72
4	A13	Add, using three addends, to sums of twelve.	73-74
5	A14	Subtract, with minuends to ten.	75-76
6	A15	Subtract, with minuends to eleven.	77-78
7	A16	Subtract, with minuends to twelve.	79-80
8	A17	Add and subtract related sentences.	81-82
9	A18	Identify related sentences for fact families.	83-84
10	PS4	Solve addition and subtraction word problems.	85-86
11	A19	Add and subtract with sums to twelve.	87
Test		Addition and subtraction facts to 12	88

Vocabulary

addition names
count by tens
target
sum
subtraction names
minus
separate
dozen
part
count by fives
related sentences
addends
order
subtract
take away
count on
fact family
whole

Printed Directions:

Put 12 eggs in each carton.
Match the rabbits to make groups of ten.
Put 11 trees in each field.

Materials

Addition name cards: sums to 12

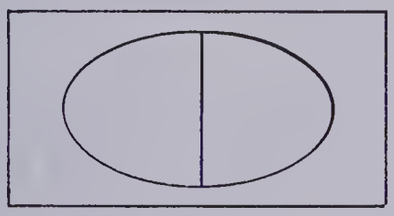
6 + 5	4 + 8

Subtraction name cards: minuends to 12

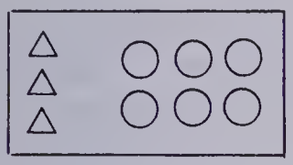
10 – 6	12 – 7

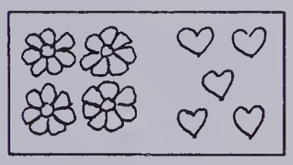
Numeral Cards for Teacher (T) and Pupil (P)

Placemats

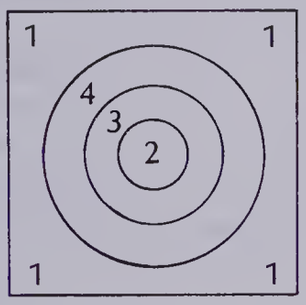


Picture Set Cards





Wall number line
Floor number line
Floor target



construction paper
paper plates
egg cartons
blocks
plastic glasses
dice
stickers
felt board
beans
scissors
deck of cards
crayons
interlocking cubes
bingo chips*
bean bags
coloured chalk
cardboard strips
rulers
felt cutouts
chart paper
graph paper

*Available in the Houghton Mifflin K-2 Activity Kit.

About This Unit

Unit 4 deals with addition and subtraction facts for of 10, 11, and 12.

For addition facts, names for 10, 11, and 12 are first developed with the help of concrete materials in lesson activities. The various arrangements of the subsets of a set of objects are then illustrated on the pupil pages, with emphasis placed on combinations involving one-digit addends. (Strictly speaking, basic addition facts are restricted to the 100 combinations involving two one-digit addends, from 0 + 0 to 9 + 9.)

Comprehension of the commutative property of addition is developed, in part, through the use of one illustration for two addition names. This property is continually reinforced on an intuitive level through the lesson activities. The term "related names" is used to refer to pairs such as 6 + 4 and 4 + 6. The term "commutative property" is used for teacher's notes and is not intended for pupil use.

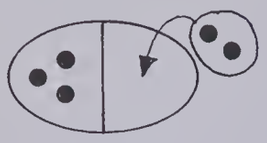
With facts for sums of ten and over, emphasis is placed on recognizing groups and using known facts to help work out and remember new combinations. With facts for sums less than ten, counting on by ones can be a useful and reasonably efficient method of working with addition (as a stage in the process of working toward basic facts recall).

However, as the numbers increase in size, counting by ones can be a cumbersome and inaccurate method, though many students will tenaciously rely on it. Students with a solid understanding of number facts to ten, who can recall these sums and differences without counting, will be more apt to grasp and use the ideas of grouping and relying on known facts. The lessons develop the idea that knowing one combination helps us to know another. Since 5 + 5 = 10, 5 + 6 will be one more than ten. Lesson activities and page illustrations reinforce this concept.

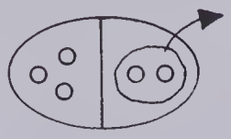
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For subtraction facts, emphasis is placed on fact families and using addition facts to help with subtraction facts. This concept has been presented for intuitive learning in Unit 2 and in the first year program, but is actively developed on pupil pages in Unit Four.

The part-whole relationship of addends and sums and the reversibility of the two operations is taught through activities that pair addition and subtraction situations.



3 + 2 = 5



5 – 2 = 3

Related fact families are used to illustrate how knowing addition combinations can help with subtraction.

2 + 5 = 7	7 – 5 = 2
5 + 2 = 7	7 – 2 = 5

Students are encouraged to think, "What goes with 4 to make 10?" to find the missing number of a sentence. Missing addend activities encourage children to add on to one subset. This facilitates the recognition of the inverse relationship of addition and subtraction.



4 + 6 = 10
10 – 6 = 4

Some students may take considerably longer than others to see the underlying relationship of addends and differences. For these the take-away model may be the most meaningful. If a cross-out or cover-up method is used to take away a subset, encourage the children to see both subsets as parts of the starting set and to describe what would happen if the two subsets were combined again.



10 – 4 = 6 6 + 4 = 10

Give the four back and there would be ten again.

Pictures illustrating addition and subtraction situations show classifications of various types. Students must be familiar with the objects illustrated to fully understand the situation pictured. For instance, when shapes are used for illustration, they may vary in colour, size, type, and/or arrangement:

colour



2 + 1 = 3

type



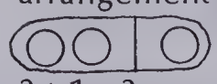
2 + 1 = 3

size



2 + 1 = 3

arrangement



2 + 1 = 3

Other classifications include:

pets	— dogs/cats
children	— boys/girls
boats	— sail/motor

In problem solving examples these classifications are especially important for non-action situations. Addition and subtraction can involve action situations:



3 + 2 = 5



5 – 2 = 5

But where no joining or separating is involved, the subsets need to be distinguished in non-action ways by such attributes as colour, size, type, etc.



5 balloons
2 are red
How many are not red?___
5 – 2 = □



2 turtles
3 fish
How many pets in all?
___ pets
2 + 3 = □

Ideas

1. Games

a. *Roll & Record*

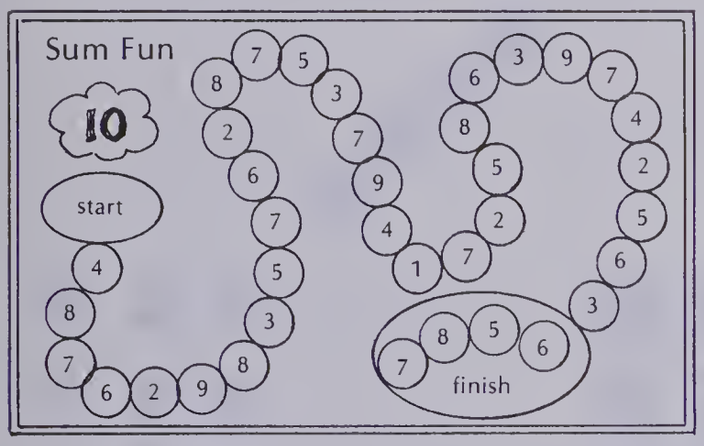
Provide each player with a pencil and a sheet of paper with columns labelled 7 to 12. In turn, players roll two dice and record the combination under the appropriate sum. If a sum of 6 or less is rolled, the player rolls again. The first player to get five names in any one column is the winner.

7	8	9	10	11	12
3 + 4		3 + 6		5 + 6 7 + 4	

b. *Sum Fun*

Make a game board with a path of one-digit numbers in mixed order from start

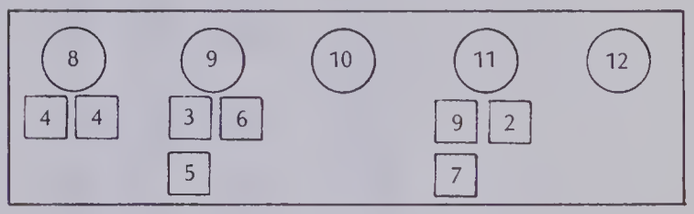
to finish. Make three game board labels [10], [11], and [12]. Decide ahead of time whether the game will be *Sum Ten*, *Sum Eleven*, or *Sum Twelve*. Label the game board accordingly. Players take turns rolling the die, deciding what goes with that number to make a sum of ten (or 11 or 12), and moving forward to that number on the game path. The first player to the end wins.



c. *Name Game*
Give each player a card labelled 10, 11, or 12. Using the mixed set of addition and subtraction name cards for 10, 11, and 12, call names one at a time. Players holding the card for that name must stand. The game can be played simply for fun during an active break, or game rules can be applied (such as points for the fastest responses).

d. *Pair-Up*
Make a game board with headings of 8, 9, 10, 11, 12 on it. Prepare a set of cards to use with the board: a. Make eight of 4s, 5s, 6s, and 7s. b. Make five of 1s, 2s, 3s, 8s, and 9s.
Players try to put down pairs of numbers that add up to a heading sum on the game board.

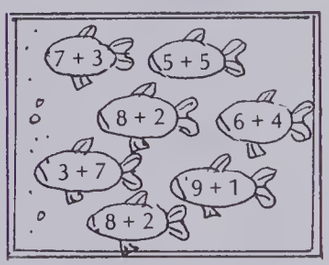
1. Five cards are dealt to each player. The remaining cards are placed on the board face down.
2. The first player puts a card from his or her hand under a heading sum, then draws a card (maintaining a hand of five cards).
3. The next player tries to find a card in his hand which added to the first player's card will make the heading sum. Once a pair is made, he collects and keeps it. Lacking such a pairing card, he may begin a sum under another heading. The player draws a card to maintain his hand and play passes to the next person.
4. Players continue taking turns until the drawing pile and as many as possible of their hand cards have been used. The player with the most pairs is the winner.



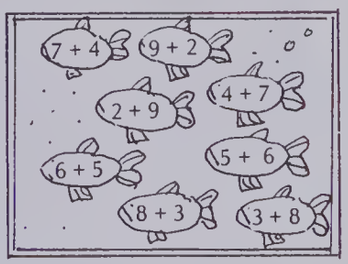
2. Bulletin Board

Make a display of large fish tanks or bowls labelled 10, 11, and 12. Have the students draw and cut out exotic fish. Label the fish with addition names of 10, 11, and 12, using one-digit addends only. Have these coloured and displayed on the appropriate tank or bowl. The display can be used as a sorting game by punching a hole in each fish so that it can be hung on a pin in the appropriate tank.

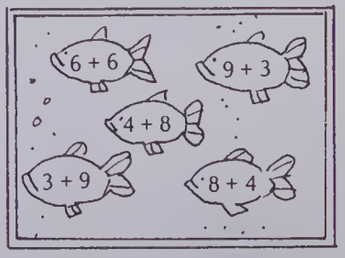
Names for 10



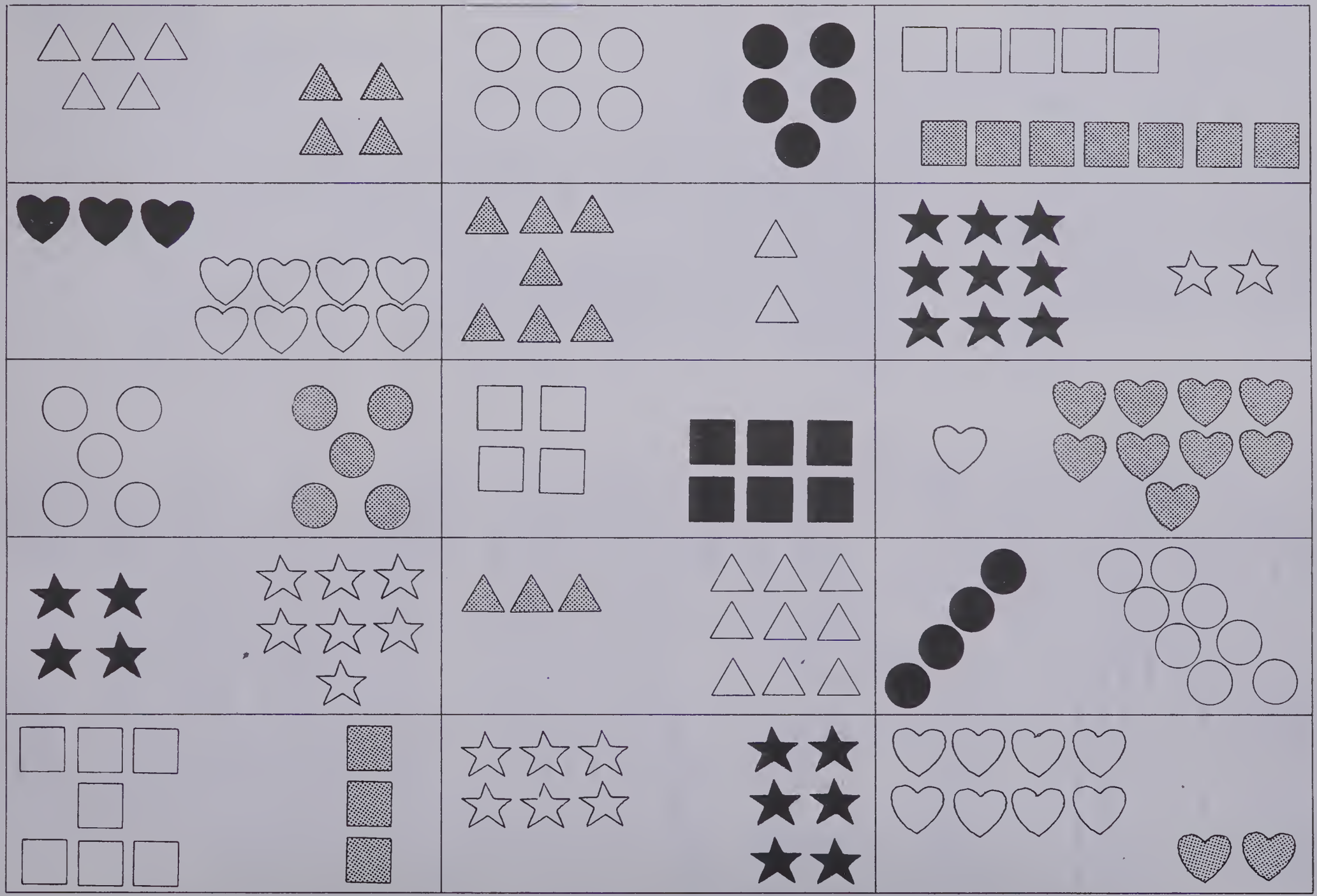
Names for 11



Names for 12



Picture Set Cards



Name _____

Pretest **Unit 4**

Add.

3 + 7 = 10	5 + 6 = 11	4 + 8 = 12	6 + 4 = 10	9 + 3 = 12	7 + 4 = 11

Subtract.

11 − 6 = 5	10 − 1 = 9	12 − 2 = 10	11 − 8 = 3	10 − 7 = 3	12 − 5 = 7

Add or subtract.

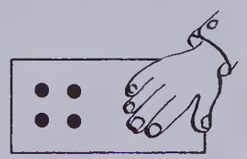
11 − 4 = 7	2 + 9 = 11	10 − 2 = 8	6 + 6 = 12	12 − 7 = 5	5 + 5 = 10

Add.

2 + 3 = 9	5 + 1 = 8	3 + 3 = 10



4 + 2 = 6



6 − 2 = 4

10 birds
7 flew away.
How many are left?

10 − 7 = 3

3 birds are left.

3 boys
8 girls
How many children?

3 + 8 = 11

11 children

Name _____

Post-test **Unit 4**

Add.

2 + 8 = 10	9 + 2 = 11	7 + 3 = 10	4 + 8 = 12	5 + 6 = 11	3 + 9 = 12

Subtract.

12 − 7 = 5	11 − 8 = 3	12 − 4 = 8	10 − 6 = 4	11 − 9 = 2	10 − 3 = 7

Add or subtract.

12 − 6 = 6	3 + 7 = 10	12 − 3 = 9	7 + 5 = 12	12 − 5 = 7	4 + 7 = 11

Add.

1 4 + 3 = 8	5 1 + 2 = 8	6 3 + 1 = 10



3 + 4 = 7

7 − 4 = 3

2 + 5 = 7

7 − 5 = 2

7 fish
2 swim away
How many are left?

7 − 2 = 5

5 fish are left.

2 blue hats
9 red hats
How many hats?

2 + 9 = 11

11 hats

UNIT 4 LESSON 1

Objective A10

Add, with sums to ten.

Vocabulary

Addition names for ten, count by tens, count by fives

Materials

Construction paper
Paper plates
Addition Name Cards
Crayons

Introducing the Lesson

Ask the children to hold up their hands. Generate addition names for ten as the students fold down the number of fingers of the first addend. Read the subsets and record each addition name on the chalkboard.



4 + 6 = 10

Direct the students to place their hands on a piece of paper, fold a few fingers, and trace their outline to show their chosen addition name for ten.

Have the students look at a traced pair of hands on the chalkboard while hiding their hands behind their backs. Say one addend in an addition name for ten. See if the students can name the other. Work for speedy responses.

Teaching the Lesson

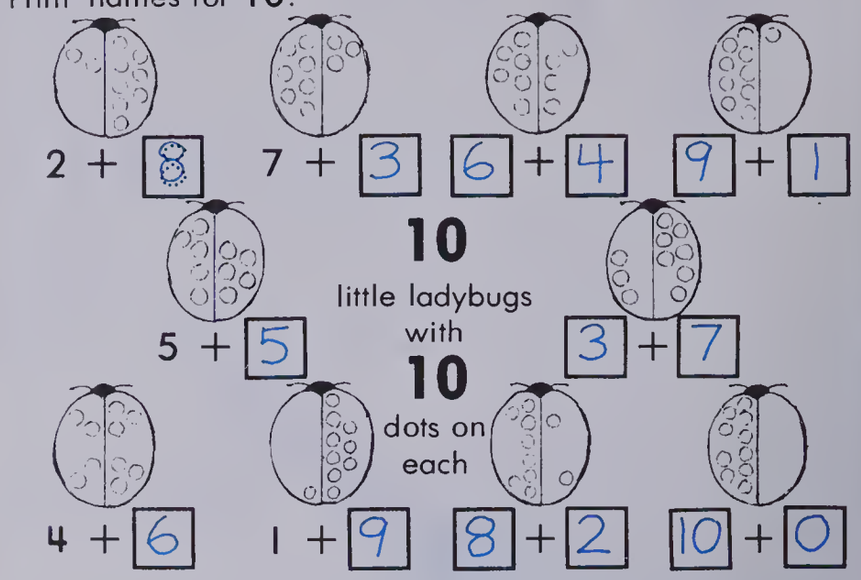
Ask the students to trace both hands on a piece of construction paper and then display them on the wall. Use these to develop patterns for counting by tens and fives. Start by counting fingers on the pairs of hands by tens. Count fingers by fives using a quiet-loud pattern at first.



Repeat counting by tens and fives. This time on the displayed paper hands record the multiples of ten in red and the multiples of five in blue. These hands can be cut out and used as an ordering game.

UNIT 4 Name _____

Print names for 10.



Add.

2 + 8 = 10	5 + 5 = 10	1 + 8 = 9	7 + 3 = 10	3 + 6 = 9	6 + 2 = 8
4 + 6 = 10	8 + 2 = 10	2 + 6 = 8	9 + 1 = 10	1 + 9 = 10	10 + 0 = 10
3 + 7 = 10	6 + 4 = 10	8 + 1 = 9	4 + 4 = 8	7 + 2 = 9	5 + 4 = 9

Sums to 10

sixty-seven 67

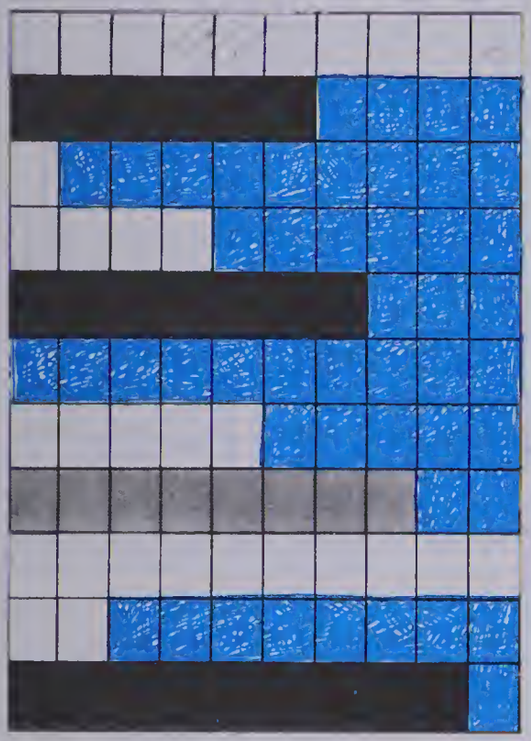
Using the Pages

- For the top of page 67, the students are to complete the addition name for ten by counting the dots on the lady bugs. The bottom of the page gives vertical addition practice with sums to 8, 9, and 10.
- Horizontal addition sentences with sums to 8, 9, and 10 must be completed at the top of page 68. The exercise at the bottom of the page can be completed by counting and/or colouring the remaining subsets of ten in each row. Cuisenaire rods or strips may be used with the exercise. The students can find the rod to match the remaining subset and colour the picture to match the rod.

Add.

3 + 7 = 10	4 + 6 = 10	2 + 8 = 10
6 + 3 = 9	7 + 2 = 9	4 + 4 = 8
5 + 5 = 10	8 + 0 = 8	6 + 4 = 10
2 + 6 = 8	1 + 9 = 10	5 + 4 = 9

Colour to show names for 10.



3 + 7 = 10
6 + 4 = 10
1 + 9 = 10
4 + 6 = 10
7 + 3 = 10
0 + 10 = 10
5 + 5 = 10
8 + 2 = 10
10 + 0 = 10
2 + 8 = 10
9 + 1 = 10

Extra Practice **Worksheet A10**

Pages 67-68

Draw circles to show names for 10.

7 + 3 = 10
5 + 5 = 10
4 + 6 = 10
3 + 7 = 10
9 + 1 = 10
10 + 0 = 10
2 + 8 = 10
1 + 9 = 10
6 + 4 = 10
8 + 2 = 10

Reinforcement

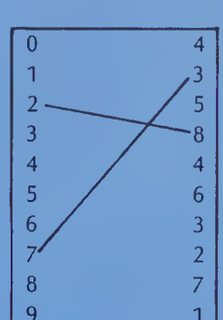
1. Display paper plates labelled 6, 7, 8, 9, and 10. Have the students match Addition Name Cards to these sums.

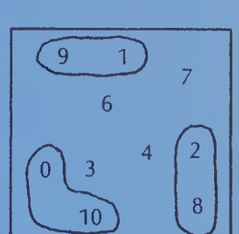
6 | 3 + 4 | 8 | 9 | 5 + 5

2. Have the students use their ten fingers to find and record names for ten. How many fingers up and how many fingers down?

fingers up	fingers down	10
9	1	9 + 1
3	7	3 + 7

3. On a small (10 cm by 10 cm) piece of paper, have each student randomly write the numbers 0 to 10. Ask them to trade their papers. Now they loop pairs of numbers that add to ten. This can be done as a race. A variation is for the students to write two columns of the numbers from 0 to 10 in mixed order on a small piece of paper, trade them, and match the numbers from one column with those of the other to make sums of ten.





Enrichment

Use a deck of cards with the face cards and the tens removed. Turn up ten cards. Players take turns trying to find pairs of numbers that add to ten. After one player has found as many pairs as possible, the other player turns over ten new cards and repeats the process. The player to get the most pairs of numbers adding to ten gets one point. The winner is the first to get five points.

UNIT 4 LESSON 2

Objective A11

Add, with sums to eleven.

Vocabulary

Addition names for eleven, related addition sentences

Materials

Interlocking cubes
Crayons

Introducing the Lesson

Ask the students to give addition names for ten. List these on the chalkboard. Have someone come up and draw an illustration of an addition name for ten. Add one more to one of the subsets and ask, "What name do we have now?" Record it and ask for the sum.



Four plus six equals ten, so four plus seven must be eleven. Repeat this procedure with other combinations until all addition names for eleven have been recorded. Keep the lists of names for ten and names for eleven on the chalkboard for use later in the lesson.

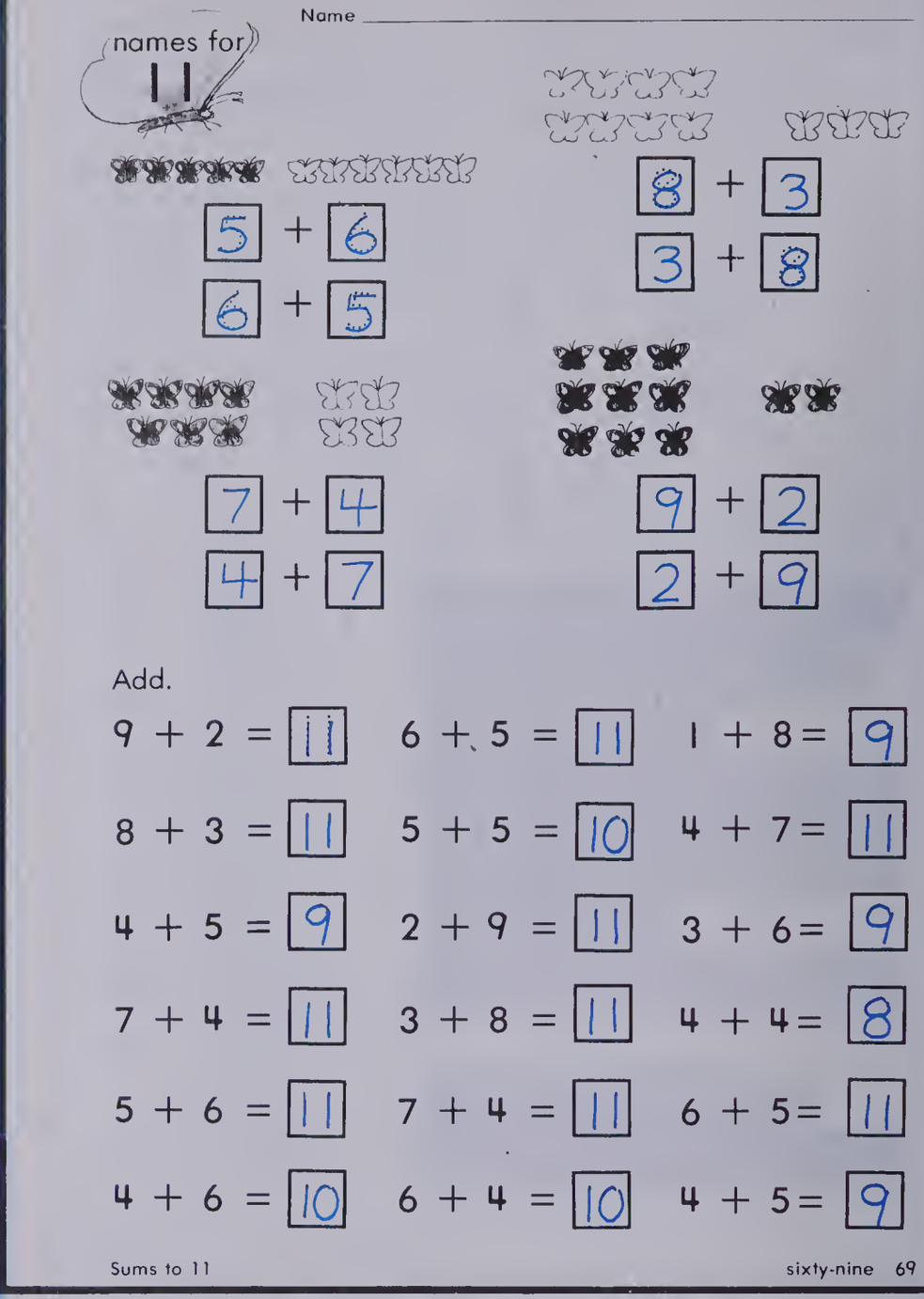
Teaching the Lesson

Have each student make block trains with interlocking cubes of two different colours. As a train is made, two **related addition sentences** are generated. At first, the students can turn the train around to get the other related sentence. Later, encourage them to think of both sentences without moving the blocks. As two related sentences are formed they should be recorded.



9 + 2 = 11 2 + 9 = 11

Using the lists of addition names for ten and eleven made earlier in the lesson, have the students think of a related addition sentence for each. Record several horizontal and vertical addition sentences that add to eleven.



Using the Pages

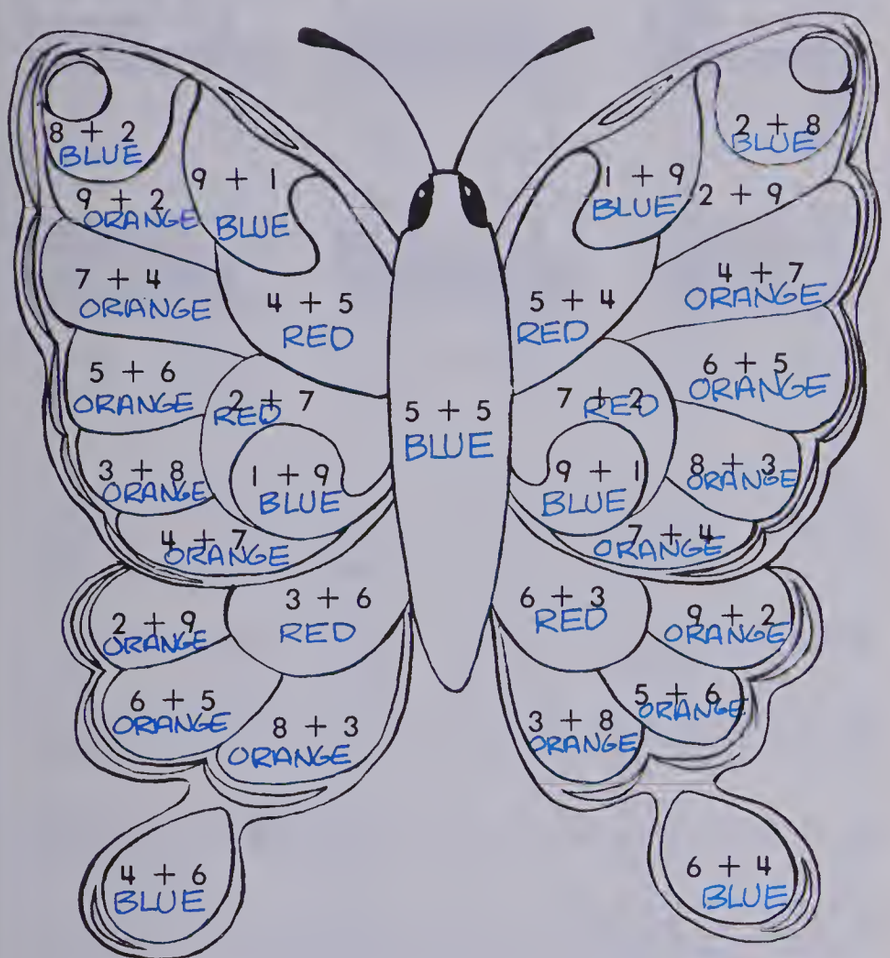
- At the top of page 69, the students are to record two addition names for each illustration, as demonstrated in the lesson. The bottom of the page provides mixed practice in adding to sums of 8, 9, 10, and 11.
- Work one or two examples with the class on page 70. Let them notice that each addition name on one wing has a related name on the other wing. Discuss the symmetry of the wings after the colouring has been completed.

Add. Colour.

9 red

10 blue

11 orange



Sums to 11

Extra Practice

Worksheet A11
Pages 69-70

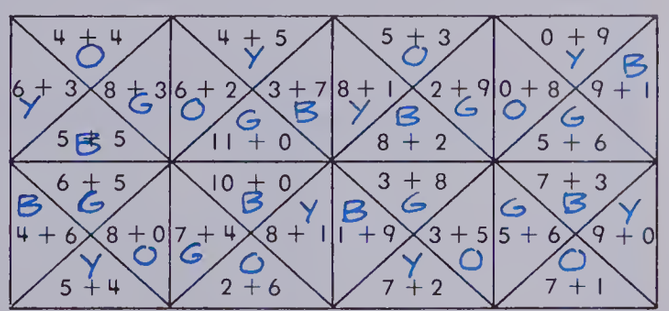
Add. Colour.

8 orange

9 yellow

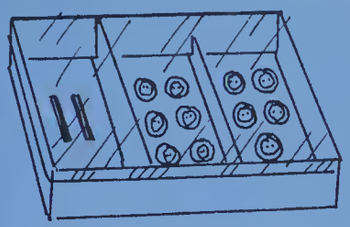
10 blue

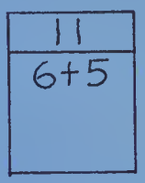
11 green



Reinforcement

1. Provide see-through number boxes labelled 10 and 11 (as suggested in the Ideas section of the introduction to Unit 2). Students can use these to shake and record addition names for 11.



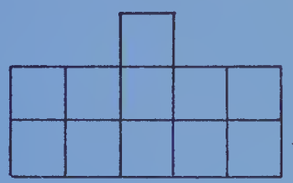


2. Provide the following worksheet or chalkboard exercise.

a. 2 + 9 = ___ **b.** 9 + 1 = ___
c. 4 + 6 = ___ **d.** 4 + 7 = ___
e. 7 + 4 = ___ **f.** 3 + 6 = ___
g. 5 + 6 = ___ **h.** 1 + 8 = ___
i. 3 + 7 = ___ **j.** 2 + 9 = ___
k. 5 + 5 = ___ **l.** 3 + 8 = ___
m. 2 + 7 = ___ **n.** 1 + 6 = ___

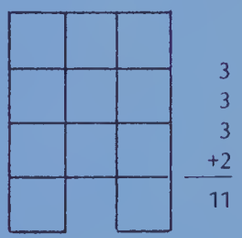
Enrichment

Using graph paper ask the children to colour sets of eleven squares and record addition names for each set by counting and recording rows and/or columns of coloured squares.



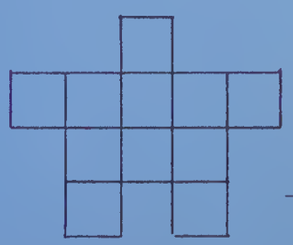
1
5
+5
11

2 + 2 + 3 + 2 + 2 = 11



3
3
3
+2
11

4 + 3 + 4 = 11



1
5
3
+2
11

1 + 3 + 3 + 3 + 1 = 11

UNIT 4 LESSON 3

Objective A12

Add, with sums to twelve.

Vocabulary

Addition names for twelve, related addition sentences
Direction words: Put 12 eggs in each carton.

Materials

Egg cartons
Bingo chips*
Paper plates
Blocks

Introducing the Lesson

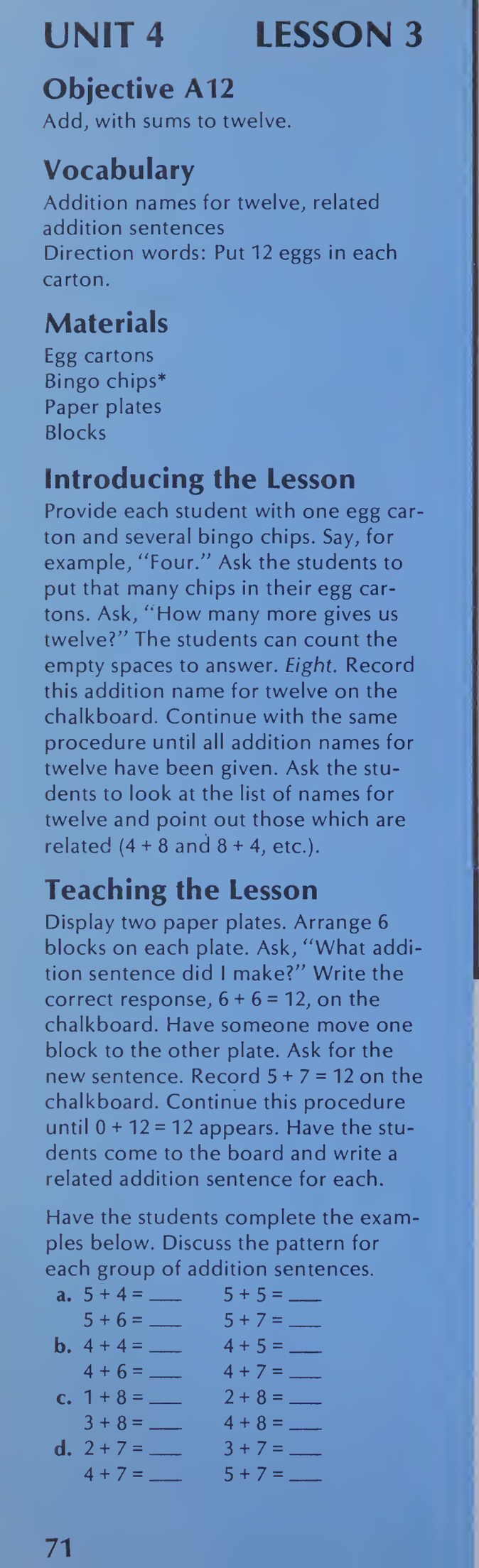
Provide each student with one egg carton and several bingo chips. Say, for example, "Four." Ask the students to put that many chips in their egg cartons. Ask, "How many more gives us twelve?" The students can count the empty spaces to answer. *Eight.* Record this addition name for twelve on the chalkboard. Continue with the same procedure until all addition names for twelve have been given. Ask the students to look at the list of names for twelve and point out those which are related (4 + 8 and 8 + 4, etc.).

Teaching the Lesson

Display two paper plates. Arrange 6 blocks on each plate. Ask, "What addition sentence did I make?" Write the correct response, 6 + 6 = 12, on the chalkboard. Have someone move one block to the other plate. Ask for the new sentence. Record 5 + 7 = 12 on the chalkboard. Continue this procedure until 0 + 12 = 12 appears. Have the students come to the board and write a related addition sentence for each.

Have the students complete the examples below. Discuss the pattern for each group of addition sentences.

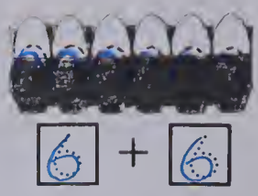
a. 5 + 4 = ___ 5 + 5 = ___
5 + 6 = ___ 5 + 7 = ___
b. 4 + 4 = ___ 4 + 5 = ___
4 + 6 = ___ 4 + 7 = ___
c. 1 + 8 = ___ 2 + 8 = ___
3 + 8 = ___ 4 + 8 = ___
d. 2 + 7 = ___ 3 + 7 = ___
4 + 7 = ___ 5 + 7 = ___



Name _____

names for
12



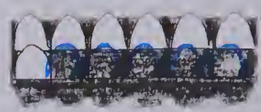


6 + 6

Put 12 eggs in each carton.



8 + 4



7 + 5



9 + 3



4 + 8



5 + 7



3 + 9

Add.

3 + 9 = 12	5 + 4 = 9	6 + 6 = 12
5 + 7 = 12	4 + 8 = 12	6 + 5 = 11
5 + 6 = 11	4 + 7 = 11	7 + 5 = 12
6 + 6 = 12	9 + 3 = 12	8 + 2 = 10
8 + 4 = 12	5 + 7 = 12	8 + 4 = 12

Sums to 12

seventy-one 71

Using the Pages

- At the top of page 71, direct the students to draw the missing eggs in each carton. The exercise is similar to the lesson activity for naming subsets of twelve. The bottom of the page provides mixed addition practice with sums to 9, 10, 11, and 12.
- Page 72 provides a review of addition facts learned so far. Counting on from 55 is reviewed at the bottom of the page.

Add.

6 + 5 = 11	9 + 1 = 10	4 + 5 = 9	6 + 2 = 8	7 + 3 = 10	9 + 2 = 11
4 + 2 = 6	6 + 3 = 9	5 + 7 = 12	3 + 8 = 11	2 + 5 = 7	7 + 5 = 12
6 + 4 = 10	8 + 1 = 9	5 + 3 = 8	2 + 9 = 11	7 + 4 = 11	4 + 5 = 9
3 + 3 = 6	9 + 1 = 10	2 + 8 = 10	7 + 2 = 9	9 + 0 = 9	8 + 4 = 12
4 + 8 = 12	2 + 6 = 8	3 + 7 = 10	4 + 3 = 7	5 + 6 = 11	9 + 3 = 12
4 + 6 = 10	8 + 3 = 11	0 + 8 = 8	4 + 7 = 11	6 + 6 = 12	8 + 2 = 10

LOOKING BACK

Keep counting.

55	56	57	58	59	60	61	62	63	64	65	

Extra Practice

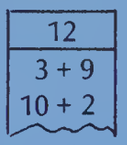
Worksheet A12
Pages 71-72

Add.

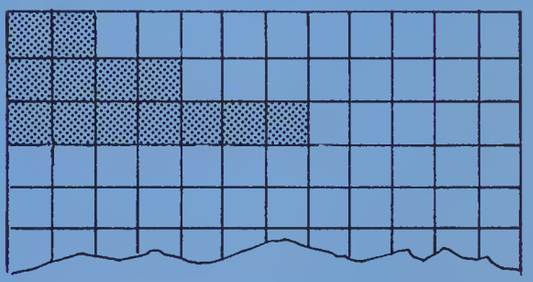
3 + 8 = 11	7 + 5 = 12	6 + 6 = 12
9 + 2 = 11	3 + 7 = 10	8 + 4 = 12
1 + 9 = 10	5 + 6 = 11	11 + 1 = 12
9 + 3 = 12	10 + 1 = 11	12 + 0 = 12
5 + 5 = 10	4 + 7 = 11	5 + 7 = 12

Reinforcement

1. Have students use twelve counters and two plates to separate and record their own list of addition names for 12.



2. Provide each student with a 12 by 13 grid of centimetre squares and two crayons. Ask them to colour each row of squares differently and to record an addition sentence about twelve for each row.



2 + 10 = 12
4 + 8 = 12
7 + 5 = 12

Enrichment

Ask the students to find as many ways as they can to make a sum of 12 using one number repeatedly. 6 + 6, 4 + 4 + 4, 3 + 3 + 3 + 3, 2 + 2 + 2 + 2 + 2 + 2, 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1. Try this with numbers other than 12. Record and display the results. Have the students look for patterns.

UNIT 4 LESSON 4

Objective A13

Add, using three addends, to sums of twelve.

Vocabulary

Target, addends, sum, order

Materials

Floor target
Bean bags
See-through plastic glasses
Blocks
Numeral Cards to 9, three of each

Introducing the Lesson

Introduce a target game to the students. Give the players three bean bags. Have them, in turn, toss them onto the floor target to try for the highest score.

At first, record the three scores for each player and have the player add his or her score. Gradually have the players record and add their own scores on the chalkboard. Stress that the order of recording and adding does not affect the **sum**.

Teaching the Lesson

Display three see-through plastic glasses. Fill them with two, three, and four blocks. Ask someone to come up and match a Numeral Card to each cup and add the blocks. *Three plus two equals five; plus four more is nine in all.* Ask someone else to record the addition sentence on the chalkboard.



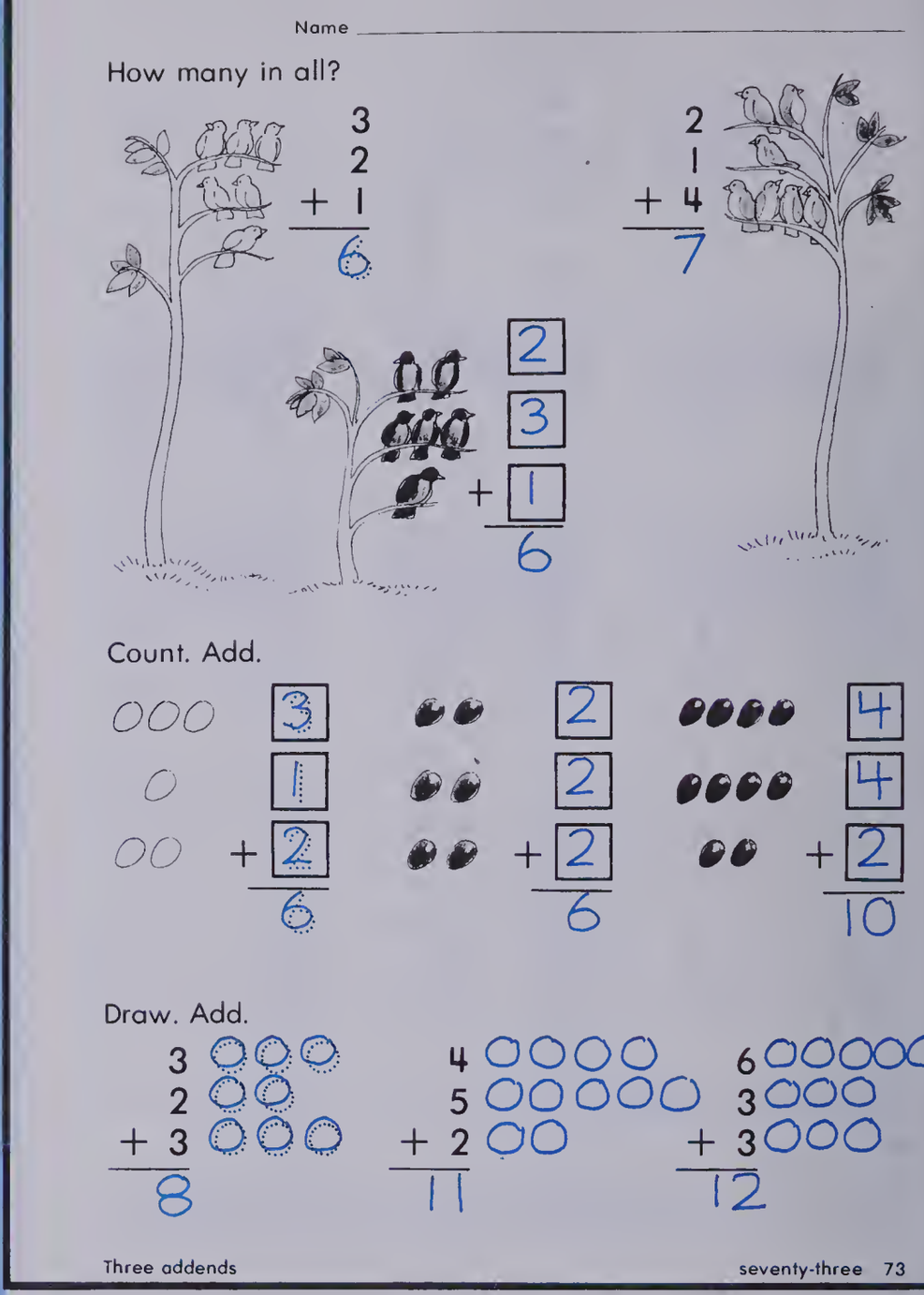
3 2 4

3 + 2 + 4 = 9

Switch the glasses to change the order of adding. See how many ways the three **addends** can be added.

Record the addition both horizontally and vertically on the chalkboard.

Reverse the above procedure by giving three Numeral Cards to a student. He or she then fills the glasses with blocks and records an addition sentence in the order given.



Name _____

How many in all?

3 + 2 + 1 = 6

2 + 1 + 4 = 7

2 + 3 + 1 = 6

Count. Add.

3 + 1 + 2 = 6

2 + 2 + 2 = 6

4 + 4 + 2 = 10

Draw. Add.

3 + 2 + 3 = 8

4 + 5 + 2 = 11

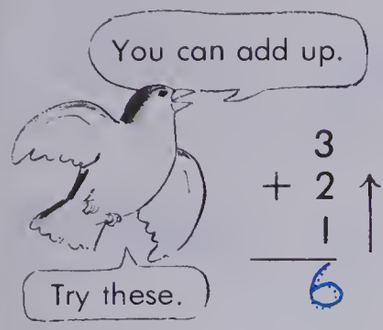
6 + 3 + 3 = 12

Three addends

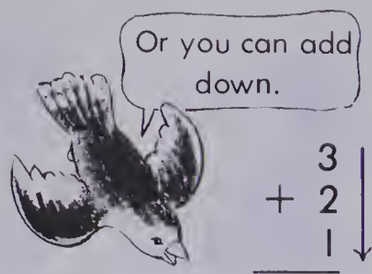
seventy-three 73

Using the Pages

- Page 73 emphasizes the meaning of addition with three addends. The pupils are to draw sets to match each addend at the bottom of the page.
- Page 74 points out that there are several ways of adding three numbers and that adding up and adding down are two of the possibilities. The bottom exercise is meant for more able students.



$$\begin{array}{r} 3 \\ +\ 2 \\ \hline 1 \\ \hline 6 \end{array}$$



$$\begin{array}{r} 3 \\ +\ 2 \\ \hline 1 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 4 \\ 2 \\ +\ 1 \\ \hline 7 \end{array} \quad \begin{array}{r} 3 \\ 5 \\ +\ 2 \\ \hline 10 \end{array} \quad \begin{array}{r} 6 \\ 3 \\ +\ 2 \\ \hline 11 \end{array} \quad \begin{array}{r} 1 \\ 3 \\ +\ 2 \\ \hline 6 \end{array} \quad \begin{array}{r} 4 \\ 1 \\ +\ 7 \\ \hline 12 \end{array} \quad \begin{array}{r} 3 \\ 2 \\ +\ 4 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 1 \\ 2 \\ +\ 4 \\ \hline 7 \end{array} \quad \begin{array}{r} 2 \\ 5 \\ +\ 3 \\ \hline 10 \end{array} \quad \begin{array}{r} 2 \\ 3 \\ +\ 6 \\ \hline 11 \end{array} \quad \begin{array}{r} 2 \\ 3 \\ +\ 1 \\ \hline 6 \end{array} \quad \begin{array}{r} 7 \\ 1 \\ +\ 4 \\ \hline 12 \end{array} \quad \begin{array}{r} 4 \\ 2 \\ +\ 3 \\ \hline 9 \end{array}$$



Use these numbers:

[2] [1] [3]

How many ways can you add them?

6

Does your answer change?

no

$$\begin{array}{r} 2 \\ 1 \\ +\ 3 \\ \hline 6 \end{array} \quad \begin{array}{r} 1 \\ 2 \\ +\ 3 \\ \hline 6 \end{array} \quad \begin{array}{r} 3 \\ 1 \\ +\ 2 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 2 \\ 3 \\ +\ 1 \\ \hline 6 \end{array} \quad \begin{array}{r} 1 \\ 3 \\ +\ 2 \\ \hline 6 \end{array} \quad \begin{array}{r} 3 \\ 2 \\ +\ 1 \\ \hline 6 \end{array}$$

Extra Practice

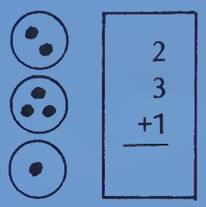
Worksheet A13
Pages 73-74

Draw. Add.

1 ○ 3 ○○○ + 2 ○○ 6	2 ○○ 5 ○○○○○ + 4 ○○○○ 11	2 ○○ 6 ○○○○○○ + 2 ○○ 10
2 ○○ 7 ○○○○○○○ + 3 ○○○ 12	6 ○○○○○○ 2 ○○ + 3 ○○○ 11	6 ○○○○○○ 3 ○○○ + 3 ○○○ 12

Reinforcement

1. Provide cards with addition examples having three addends. Have the less able students use cups and counters to model the addition and then add to find the sum. The problem cards can be made self-checking by having the sum recorded on the back.



2. Use the target game from the lesson as an independent, small group activity. Provide paper to each group for the recording of scores.

Enrichment

Using the model exercise on page 74, have the students find out how many different ways there are of adding three numbers. "Are there always six different ways? What about four numbers?"

UNIT 4 LESSON 5

Objective A14

Subtract, with minuends to ten.

Vocabulary

Subtract, minus, take away, subtraction sentence, subtraction name
Direction words: Match the rabbits to make groups of ten.

Materials

Red and blue chalk
P* Numeral Cards
Paper plates
Subtraction Name Cards

Introducing the Lesson

Ask the students to place both hands, palms down, on their desks. Say a subtraction name for them to solve by folding down their fingers and finding the remaining number of fingers. Have a student record the corresponding subtraction sentence.



"Ten minus three." 10 – 3 = 7
Seven.

Repeat with several similar examples.

Teaching the Lesson

Draw several large bags on the chalkboard. Draw a set of marbles in a bag with red chalk. Ask a student to come up and draw marbles with blue chalk so that there are ten marbles in the bag. Ask, "How many were added to get ten?" *Six.* Record 4 + 6 = 10. Cover one set of marbles with your hand (the set of four red marbles) and ask, "What is ten minus four?" *Six.* Record 10 – 4 = 6. Cover the set of blue marbles and generate the subtraction sentence 10 – 6 = 4.

Give each student P* Numeral Cards 0 to 10. Say subtraction names and ask the students to complete a subtraction sentence by holding up the appropriate Numeral Card.

Say any number from zero to ten. Ask the students to hold up the number that goes with it to make ten.

Name _____



10 – 2 = 8 | 10 – 9 = 1

10 – 3 = 7 | 10 – 7 = 3

10 – 1 = 9 | 10 – 5 = 5 | 10 – 6 = 4

10 – 0 = 10 | 10 – 8 = 2 | 10 – 4 = 6

Subtract.

10 – 6 = 4	9 – 2 = 7	10 – 5 = 5
9 – 4 = 5	10 – 3 = 7	9 – 6 = 3
10 – 1 = 9	8 – 2 = 6	7 – 0 = 7
8 – 5 = 3	10 – 7 = 3	8 – 7 = 1
7 – 4 = 3	10 – 2 = 8	10 – 4 = 6

Subtraction facts to 10 seventy-five 75

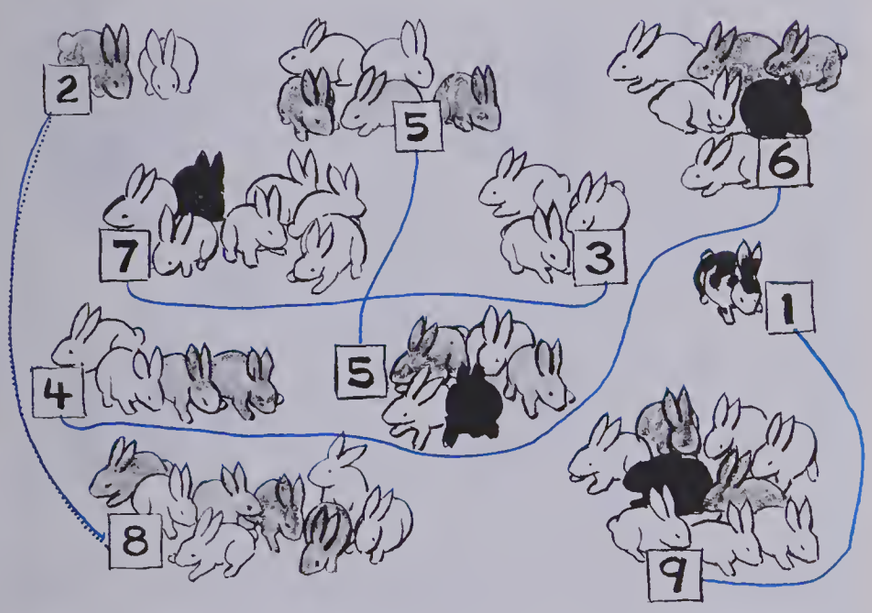
Using the Pages

- On page 75 the students are to complete horizontal subtraction sentences. The top of the page provides a model, while the bottom of the page does not.
- The top of page 76 offers mixed vertical subtraction practice. At the bottom of the page the students are to join two sets of rabbits to make ten in all.

Subtract.

10 − 3 = 7	9 − 3 = 6	8 − 4 = 4	10 − 5 = 5	9 − 7 = 2
9 − 5 = 4	10 − 6 = 4	10 − 9 = 1	9 − 4 = 5	8 − 3 = 5
10 − 7 = 3	8 − 6 = 2	10 − 2 = 8	9 − 2 = 7	10 − 1 = 9

Match the rabbits to make groups of ten.



Extra Practice

Worksheet A14
Pages 75-76

Cross out. Subtract.

○○○○○○○○○ 9 − 5 = 4	△△△△△△△△△△ 10 − 3 = 7	□□□□□□□□ 8 − 5 = 3
□□□□□□□□□□ 10 − 6 = 4	⌓⌓⌓⌓⌓⌓⌓⌓⌓ 9 − 3 = 6	◇◇◇◇◇◇◇◇◇◇ 10 − 9 = 1
△△△△△△△△ 8 − 6 = 2	♡♡♡♡♡♡♡♡♡♡ 10 − 2 = 8	○○○○○○○ 7 − 5 = 2

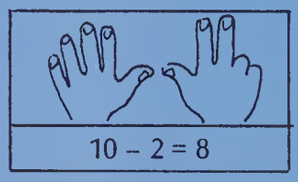
Reinforcement

1. Display paper plates labelled from 0 to 10. Give the students subtraction name cards to place on the appropriate plate.



2. Use the Subtraction Name Cards for a review of the subtraction facts with minuends of 8, 9, and 10. As the cards are flashed the fact may or may not be said aloud. Responses can be oral or written. Correct or praise each as it is completed for immediate reinforcement.

3. Have the students trace and cut out both hands on construction paper. Ask them to fold a few fingers down and then glue the pair of hands to a card. The cards can then be exchanged and the corresponding subtraction sentence can be written by another student.



Enrichment

Prepare card strips of vertical addition and subtraction sentences. Have students complete the sentences, then punch holes to obliterate one addend. Trade the cards. Have students try to find the missing addends and write them beside each hole. Or, an answer key can be made on a separate card, and children can print answers through the holes onto paper, and use the answer key to check their responses.

4 + ● = 10	● +3 = 8	9 − ● = 7	5 + ● = 9	● +2 = 7	10 − ● = 8

Answer Key

6	5	2	4	5	2

UNIT 4 LESSON 6

Objective A15

Subtract, with minuends to eleven.

Vocabulary

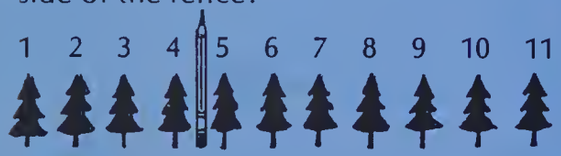
Separate, subtract, minus, take away, count on
Direction words: Put 11 trees in each field.

Materials

Paper
Pencils
Floor number line

Introducing the Lesson

Provide each student with a paper and pencil. Instruct them to draw eleven trees across the top of their paper in a row. Explain that their pencils are a fence and that they are helping Farmer Brown choose where to put his fence. "He has eleven trees in all. If a fence separates four trees from the rest, how many trees are on the other side of the fence?"



11 – 4

Encourage them to count on from the fence while tallying the count and keeping track of how many they have counted, e.g., 11 – 4: *Five, six, seven, eight, nine, ten, eleven. That's seven trees.*

Teaching the Lesson

Play a "How Many Are Hidden?" game with the drawings of eleven trees. Ask the students to hide some of the trees with one hand and then count on to eleven from the visible trees to determine the number of hidden trees.



Eight. *Nine, ten, eleven.*
Three are hidden.

11 – 8 = 3

Name _____

11 cows



11 − 2 = 9	11 − 3 = 8	11 − 4 = 7	11 − 5 = 6
11 − 6 = 5	11 − 7 = 4	11 − 8 = 3	11 − 9 = 2

Subtract.

11 − 2 = 9	11 − 8 = 3	11 − 4 = 7	11 − 3 = 8	
11 − 5 = 6	11 − 9 = 2	11 − 7 = 4	11 − 6 = 5	
10 − 3 = 7	11 − 4 = 7	9 − 7 = 2	8 − 5 = 3	11 − 5 = 6



Subtraction facts to 11 seventy-seven 77

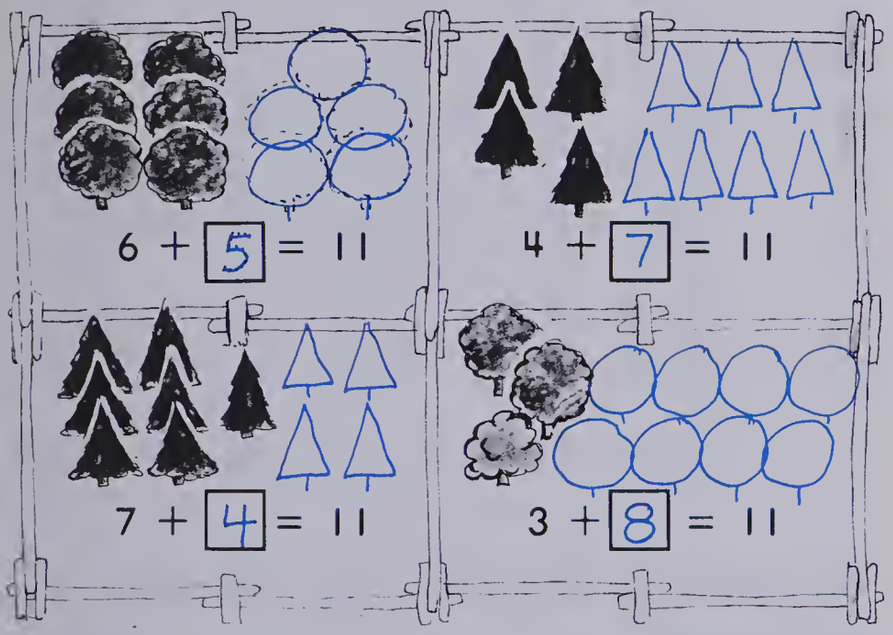
Using the Pages

- The students can use the eleven animals at the top of page 77 to partition the subsets using their pencils as a fence.
- The top of page 78 provides mixed horizontal subtraction practice. At the bottom of the page they are to add on the missing subset to make eleven trees in each field.

Subtract.

11 − 2 = 9	11 − 4 = 7	11 − 8 = 3
10 − 5 = 5	11 − 6 = 5	10 − 4 = 6
11 − 7 = 4	9 − 5 = 4	11 − 3 = 8
9 − 1 = 8	11 − 9 = 2	9 − 7 = 2
11 − 3 = 8	9 − 3 = 6	11 − 5 = 6

Put 11 trees in each field.



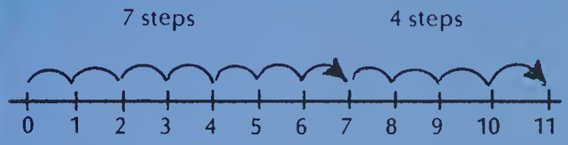
Extra Practice **Worksheet A15**
Pages 77-78

Subtract.

11 − 6 = 5	10 − 4 = 6	11 − 8 = 3	10 − 2 = 8	11 − 3 = 8
10 − 5 = 5	11 − 9 = 2	10 − 1 = 9	11 − 5 = 6	10 − 3 = 7
11 − 4 = 7	10 − 6 = 4	11 − 1 = 10	10 − 7 = 3	11 − 7 = 4

Reinforcement

1. Have a student "walk out" an addition name for eleven on a floor number line. Show how this can help complete a related subtraction sentence.



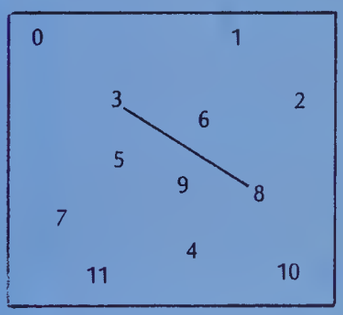
7 + 4 = 11, so 11 − 4 = 7

2. Write several numbers less than twenty in random order at the top of chart-sized graph paper. Have the students count back a given number of times from each number.

Record the count under each starting number.

	14		7		11		18
	13		6				
	12		5				
	11		4				

3. Have the students write the numerals from 0 to 11 in mixed order on a piece of paper. Ask them to join pairs of numbers that equal 11. Have them write two subtraction sentences for each pair. Students may record addition sentences as well.



11 − 3 = 8
11 − 8 = 3
8 + 3 = 11
3 + 8 = 11

Enrichment

Provide paper and crayons. Have each student draw and cut out a farm animal (or more than one). Paste these in pictograph form on chart paper. Use the graph as a source of oral problem-solving work. Emphasize comparisons: "How many more chickens than cows?"

UNIT 4 LESSON 7

Objective A16

Subtract, with minuends to twelve.

Vocabulary

Dozen, subtract, take away, minus, subtraction sentence

Materials

Egg cartons
Blocks
Construction paper
Dice

Introducing the Lesson

Fill an egg carton with twelve blocks. Record 12 – 0 = 12 on the chalkboard. Pass the carton to a student and ask him or her to remove an "egg". Record 12 – 1 = □ and ask the student to record the difference. Pass the carton again. Have another egg removed. Record 12 – 2 = □. Continue until all eggs are removed and 12 – 12 = 0 is recorded.

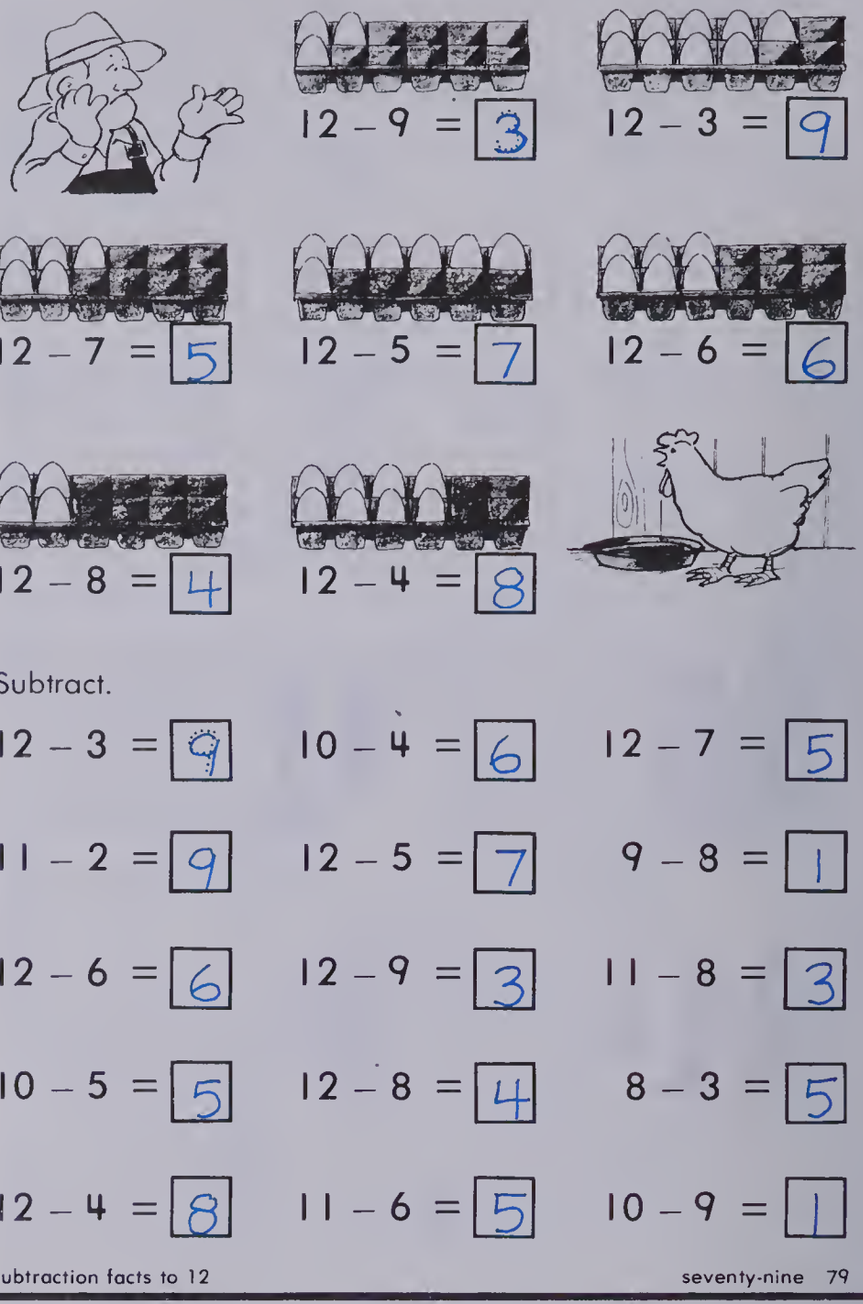
Teaching the Lesson

Fill the egg carton with eight blocks. Ask, "How many are there when the carton is full?" *Twelve.* "How many are missing?" *Four.* "How many are left?" *Eight.* Record 12 – 4 = 8 on the chalkboard. Repeat, asking individual students to record each example.

Provide egg cartons as a visual aid. Ask, "If five eggs are missing, how many are left?" *Seven.* Write the corresponding subtraction sentence, 12 – 5 = 7. Repeat.

Make twelve large construction paper eggs (about 9 cm by 12 cm). Write "8" on one side of the egg. Ask, "What number should be written on the other side so that both sides add to twelve?" *Four.* Repeat. Use the eggs for a guessing game to find the hidden numbers.

Roll a die marked 3, 4, 5, 6, 7, 8. Ask a student to subtract the rolled number from twelve. Roll the die again. This time ask the students to write the corresponding subtraction sentence. Repeat.



Name _____

12 – 9 = 3

12 – 3 = 9

12 – 7 = 5

12 – 5 = 7

12 – 6 = 6

12 – 8 = 4

12 – 4 = 8

Subtract.

12 – 3 = 9	10 – 4 = 6	12 – 7 = 5
11 – 2 = 9	12 – 5 = 7	9 – 8 = 1
12 – 6 = 6	12 – 9 = 3	11 – 8 = 3
10 – 5 = 5	12 – 8 = 4	8 – 3 = 5
12 – 4 = 8	11 – 6 = 5	10 – 9 = 1

Subtraction facts to 12 seventy-nine 79

Using the Pages

- For the top of page 79, the students can use egg cartons to see how many eggs are missing and how many are left. The bottom of the page provides mixed horizontal subtraction practice.
- The top of page 80 can be used for vertical subtraction practice or as a timed drill. Counting back is reviewed at the bottom of the page.

Subtract.

11 − 2 = 9	10 − 4 = 6	8 − 3 = 5	12 − 6 = 6	11 − 9 = 2	9 − 8 = 1
12 − 4 = 8	9 − 8 = 1	11 − 3 = 8	12 − 3 = 9	9 − 4 = 5	10 − 9 = 1
8 − 7 = 1	10 − 8 = 2	9 − 5 = 4	11 − 6 = 5	9 − 1 = 8	12 − 7 = 5
10 − 1 = 9	12 − 5 = 7	9 − 7 = 2	10 − 3 = 7	8 − 0 = 8	11 − 4 = 7
11 − 5 = 6	10 − 7 = 3	8 − 6 = 2	9 − 9 = 0	10 − 6 = 4	10 − 4 = 6
12 − 8 = 4	9 − 3 = 6	11 − 7 = 4	10 − 5 = 5	12 − 9 = 3	11 − 8 = 3

LOOKING BACK

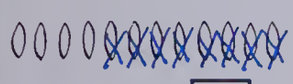
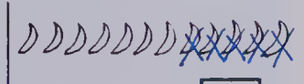
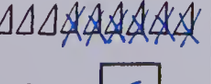
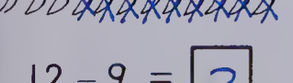
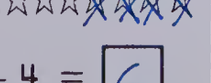
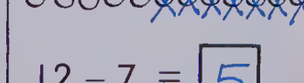
Keep counting.

65	64	63	62	61	60	59	58	57	56	55

Extra Practice **Worksheet A16**

Pages 79-80

Cross out. Subtract.

 12 − 8 = 4	 11 − 6 = 5	 12 − 5 = 7
 10 − 7 = 3	 12 − 6 = 6	 11 − 8 = 3
 12 − 9 = 3	 10 − 4 = 6	 12 − 7 = 5

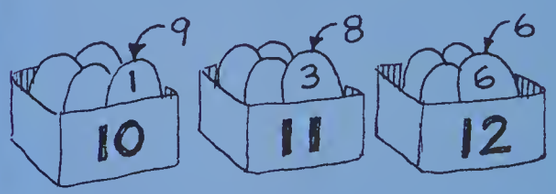
Reinforcement

1. Model subtraction names from twelve for the students to complete and record using egg cartons and counters.

2. Provide pairs of students with a die marked 3, 4, 5, 6, 7, 8 and paper for recording 12 − □ = □ examples. Ask them to roll the die, record the subtraction name, and complete the subtraction sentence. Each correct response earns one point. The first student with six points wins.

Enrichment

Display large construction paper baskets labelled 10, 11, and 12. Have the students make a large paper egg, choose an addition fact to 10, 11, or 12, and write one addend on the front and the other addend on the back of the egg. Ask the students to place their eggs in the appropriate baskets. Continue until all combinations have been found.



Take an egg out of a basket and hold it up. Ask for the hidden number. Repeat.

UNIT 4 LESSON 8

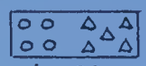
Objective A17

Add and subtract related sentences.

Vocabulary

Add and subtract, join and take away, related sentences

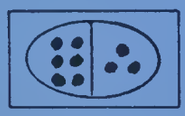
Materials

Placemats 
Beans
Picture Set Cards 
Blank Cards (20 cm by 30 cm)

Introducing the Lesson

Provide each student with a placemat and beans. Ask the students to follow these directions. "Make a group of six. Add three. How many in all?" *Nine.* Record the addition sentence.

6
6 + 3
6 + 3 = 9

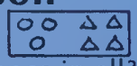


"Now, start with nine. Cover up three. (Subtract three.) How many are left?" *Six.* Record the related subtraction sentence.

9
9 – 3
9 – 3 = 6

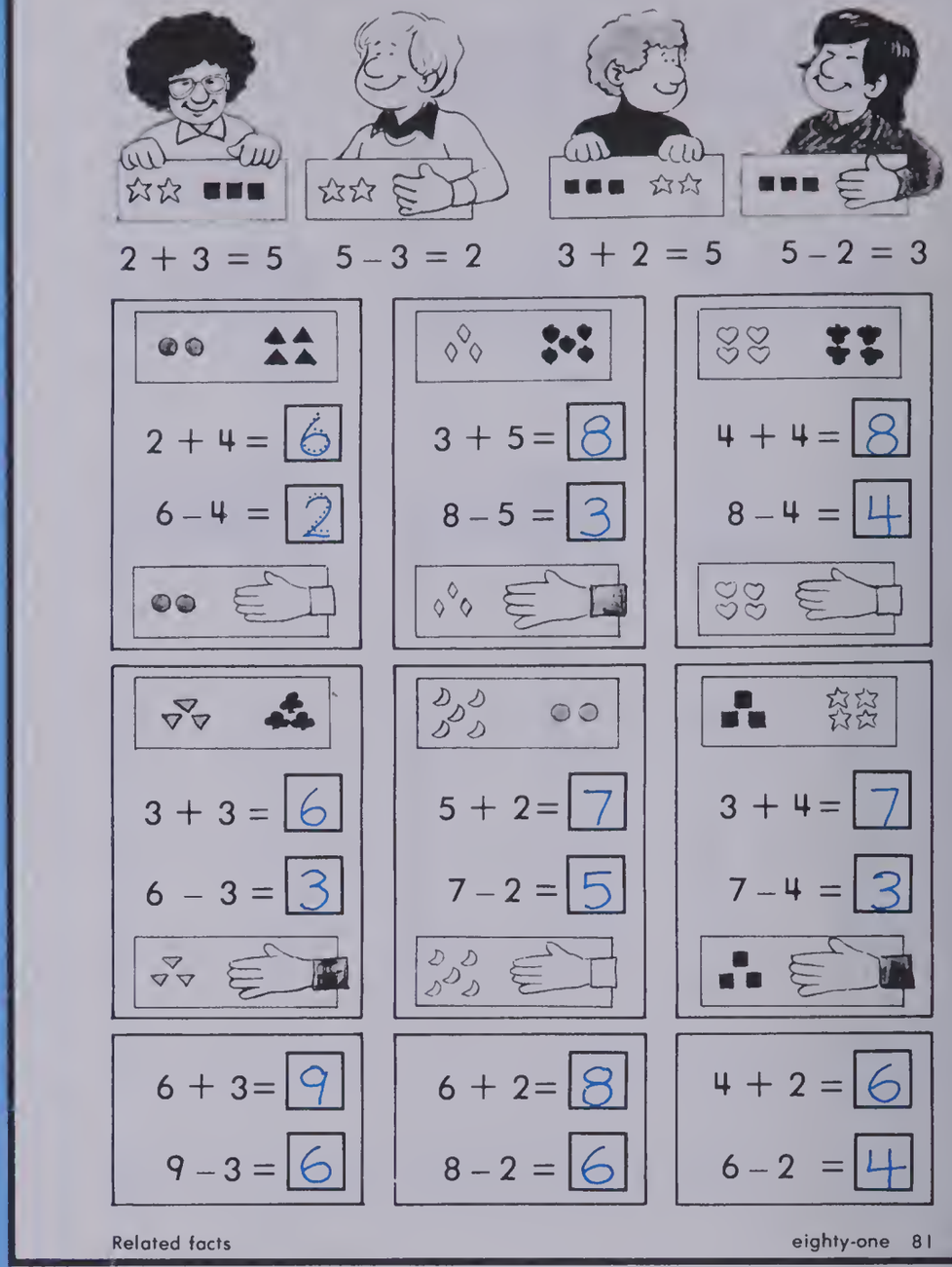


Teaching the Lesson

Show a Picture Set Card  and ask, "How many shapes in all? How many circles? How many triangles?" Record 3 + 4 = 7 on the chalkboard.

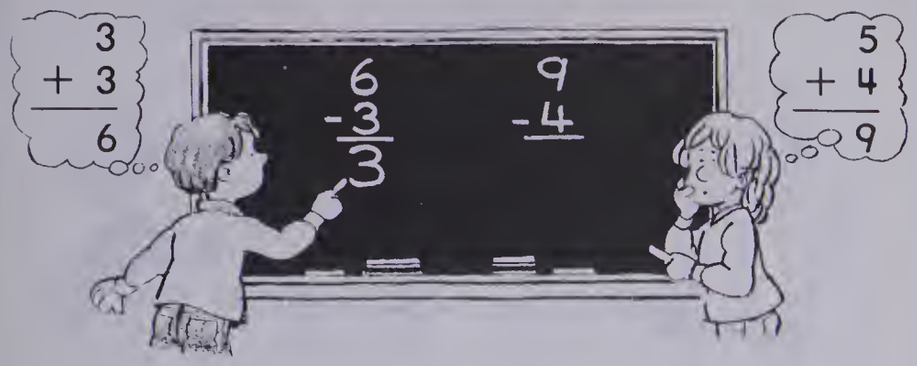
Cover the four triangles and ask, "How many shapes did we start with?" *Seven.* "How many did I hide?" *Four.* "How many are left?" *Three.* Record 7 – 4 = 3.

Explain how these sentences relate to each other. "If three and four give us seven in all, then seven minus four must be three." Show how to read 7 – 4 = □ as the number that goes with 4 to make 7 in all.



Using the Pages

- Discuss the illustration at the top of page 81. Use the cards from the lesson to demonstrate how the pairs of sentences are related.
- Discuss the illustration on page 82. Ask the students how the addition sentence can help them solve the related subtraction sentence.



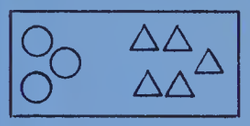
2 + 6 = 8	8 - 6 = 2	7 + 3 = 10	10 - 3 = 7	5 + 3 = 8	8 - 3 = 5
6 + 3 = 9	9 - 3 = 6	4 + 4 = 8	8 - 4 = 4	9 + 1 = 10	10 - 1 = 9
8 + 2 = 10	10 - 2 = 8	7 + 2 = 9	9 - 2 = 7	5 + 2 = 7	7 - 2 = 5
1 + 7 = 8	8 - 7 = 1	5 + 5 = 10	10 - 5 = 5	1 + 8 = 9	9 - 8 = 1

Extra Practice **Worksheet A17**
Pages 81-82

		
3 + 7 = 10	6 + 2 = 8	2 + 7 = 9
10 - 7 = 3	8 - 2 = 6	9 - 7 = 2
		
5 + 3 = 8	4 + 6 = 10	1 + 8 = 9
8 - 3 = 5	10 - 6 = 4	8 + 1 = 9

Reinforcement

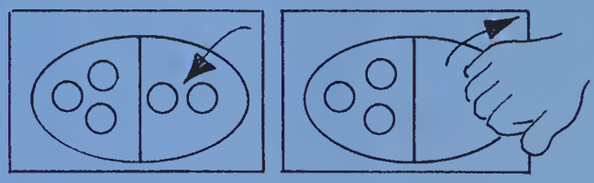
1. Choose a Picture Set Card. Ask a student to say an addition sentence to match the card and then to write the sentence with a felt pen on a 10 cm by 20 cm card. Ask another student to reverse the addition sentence to say the related subtraction sentence and then to write it on another card.



3 + 5 = 8 8 - 5 = 3

Use the related sentence cards for a matching game after several pairs of cards have been made.

2. Provide placemats, counters, and Addition and Subtraction Name Cards for students who require more concrete experience with the inverse relationship. Have them model addition and subtraction names and then record the sums and differences.



3 + 2 = □ 5 - 2 = □

3. Use the related sentence cards from the lesson for a matching game for individual or small group use. The rules for the game can be similar to those for "Old Maid".

2 + 3 = 5 5 - 3 = 2

Enrichment

Using the Picture Set Cards, encourage students to record addition and subtraction sentences to match it. Some students may be able to find all four members of the **fact family** for each card.



2 + 4 = 6 6 - 4 = 2
4 + 2 = 6 6 - 2 = 4

UNIT 4 LESSON 9

Objective A18

Identify related sentences for fact families.

Vocabulary

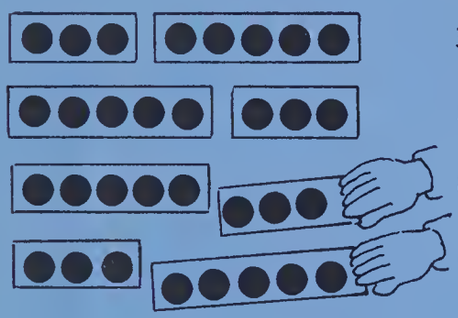
Related sentences, fact family, part, whole

Materials

Cardboard strips
Stickers
Beans
T Numeral Cards

Introducing the Lesson

Prepare cardboard strips with from six to ten stickers attached. Choose a strip and cut it into two parts in front of the children. Use these two parts as a model for related addition and subtraction sentences. Record each sentence as it is modelled.



3 + 5 = 8

5 + 3 = 8

8 – 3 = 5

8 – 5 = 3

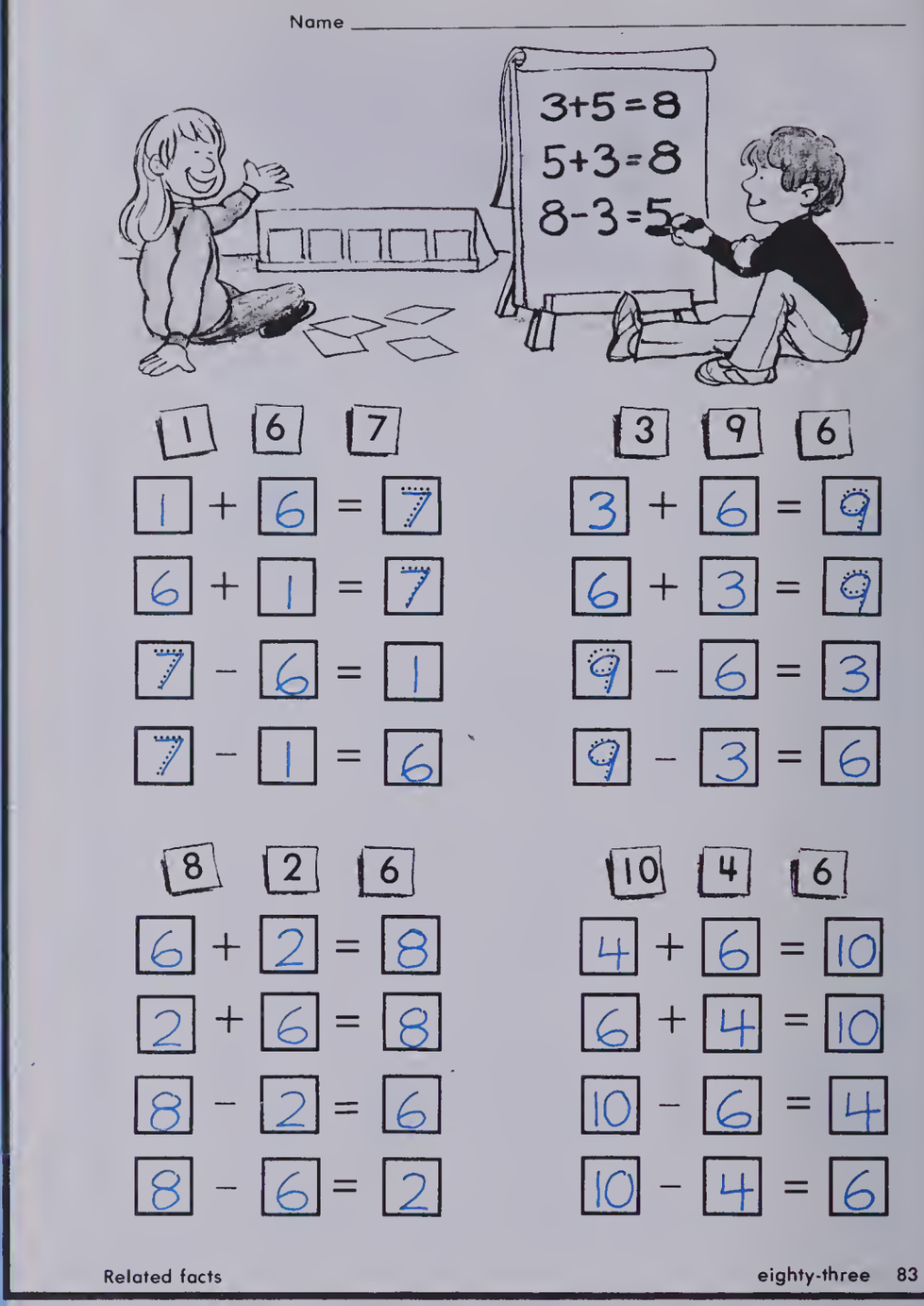
Emphasize the part/whole relationships. Explain that in addition we know the number in each part and we add to find how many there are in the whole group. For subtraction we start with the whole group and subtract a part, leaving the other part.

Teaching the Lesson

Give each student several beans and ask them to follow these directions. "Take six beans. Put two of them in one hand and the rest in the other hand." Ask the students to name two addition and two subtraction sentences about the beans. Have someone record them on the chalkboard.

2 + 4 = 6	6 – 4 = 2
4 + 2 = 6	6 – 2 = 4

Repeat, using several different starting sets of beans.



Using the Pages

- Page 83 is similar to the lesson activity. Some students may need to use materials or may need a guided lesson to find all four *fact family* members.
- On page 84 emphasize that the students must watch the signs to complete this review page, as it contains mixed addition and subtraction examples.

Add or subtract.

3 + 8 = 11	12 − 6 = 6	2 + 9 = 11	10 − 6 = 4	12 − 5 = 7	6 + 5 = 11
11 − 4 = 7	6 + 4 = 10	4 + 7 = 11	11 − 2 = 9	7 + 3 = 10	12 − 8 = 4
12 − 7 = 5	7 + 4 = 11	9 + 3 = 12	11 − 8 = 3	5 + 6 = 11	8 + 2 = 10
10 − 5 = 5	11 − 3 = 8	8 + 4 = 12	12 − 4 = 8	4 + 8 = 12	12 − 3 = 9
11 − 7 = 4	3 + 9 = 12	5 + 7 = 12	11 − 9 = 2	9 + 1 = 10	12 − 9 = 3
6 + 2 = 10	4 + 3 = 11	1 + 8 = 10	5 + 4 = 12	6 + 2 = 11	1 + 7 = 10

LOOKING BACK

Which is greater?

50 or (71) (65) or 59 63 or (72) 37 or (73)

Add or subtract to 12

Extra Practice

Worksheet A18

Pages 83-84

(4) (5) (9)	(6) (2) (8)
4 + 5 = 9	6 + 2 = 8
5 + 4 = 9	2 + 6 = 8
9 − 5 = 4	8 − 6 = 2
9 − 4 = 5	8 − 2 = 6

Reinforcement

1. Place three Numeral Cards on the chalk ledge. Ask the students to arrange the cards to make four related addition and subtraction sentences. [2] + [5] = [7], [5] + [2] = [7], [7] − [2] = [5], and [7] − [5] = [2].

Play an "If I Know" game to relate addition and subtraction. Give a student three related numeral cards ([3], [4], [7]). The student forms a true sentence with these cards, shows the class, and then says, "If I know that 4 + 3 = 7, what else do I know?" Another student must respond with the three other *fact family* members in order to take the place of the first student.

2. Provide the following chalkboard exercise or worksheet of related addition and subtraction sentences. Have students solve and then match.

2 + 6 = □ (8)	9 − 2 = □
5 + 4 = □	8 − 1 = □
7 + 2 = □	8 − 6 = □ (2)
6 + 3 = □	10 − 7 = □
3 + 5 = □	9 − 3 = □
2 + 8 = □	10 − 8 = □
7 + 1 = □	9 − 4 = □
3 + 7 = □	8 − 5 = □

3. Have the students write two addition and two subtraction sentences for each cardboard sticker strip used in the lesson.



6 + 3 = 9
3 + 6 = 9
9 − 3 = 6
9 − 6 = 3

Enrichment

Using sets of three related Number Cards, have students record four *fact family* members for each.



3 + 5 = 8
5 + 3 = 8
8 − 5 = 3
8 − 3 = 5

UNIT 4 LESSON 10

Objective PS4

Solve addition and subtraction word problems.

Vocabulary

Part, whole, add, subtract, addition sentence, subtraction sentence

Materials

Felt board
Felt cutouts
Paper
Pencils
Crayons

Introducing the Lesson

Ask individual students to come up to the felt board and display these kinds of addition and subtraction situations.

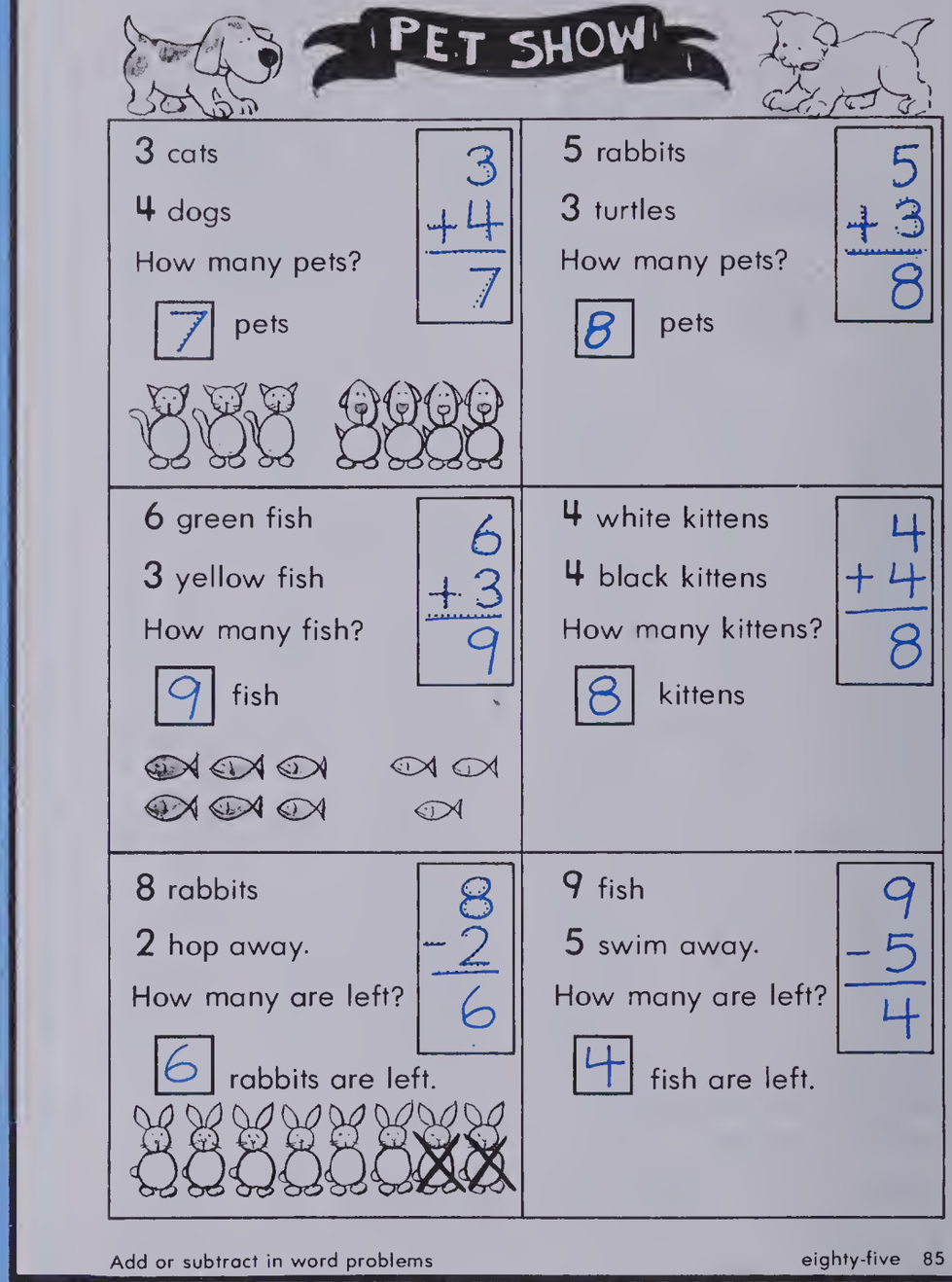
a. "Show me five cats and three dogs. How many animals (or pets) are there in all?"
Eight.

b. "Show me eight dogs. Three run away. How many are left?"
Five.

Teaching the Lesson

Provide paper, pencil, and crayons for each student. Ask the students to fold their papers into four parts. Explain that they are to draw a picture to help answer these questions.
1. "In the first part, draw three cats and two dogs. How many pets are there?" (addition)
2. "Draw eight fish. Three of the fish are green. Colour them. How many fish are not green?" (subtraction, set-subset situation)
3. "Draw six turtles. Two turtles walk away. Cross them out. How many turtles are left?" (subtraction, take-away situation)

After one or two examples of each of the above three types of problems, go back and have the students record the number sentences that describe each situation. As each sentence is recorded, discuss: **a.** what information is given, **b.** what you are looking for, **c.** whether you should add or subtract.



Using the Pages

- Page 85 can be done as an oral guided lesson. Show the students that pictures are given for the examples on the left, while they are to draw pictures for those on the right.
- Page 86 follows the same procedure as page 85 and can be done independently.

7 cats

3 are black cats.

$7 - 3 = 4$

How many are not black?

4 cats are not black.



9 fish

2 are green fish.

$9 - 2 = 7$

How many are not green?

7 fish are not green.

2 green turtles

5 black turtles

$2 + 5 = 7$

How many turtles?

7 turtles



1 big dog

6 little dogs

$1 + 6 = 7$

How many dogs?

7 dogs

10 birds

4 birds fly away.

$10 - 4 = 6$

How many are left?

6 birds are left.



6 kittens

3 run away.

$6 - 3 = 3$

How many are left?

3 kittens are left.

Extra Practice **Worksheet PS4**

Pages 85-86

3 red pencils

7 blue pencils

How many pencils?

$3 + 7 = 10$

10 pencils



6 cats

4 ran away.

How many are left?

$6 - 4 = 2$

2 cats



9 candles

4 burn out.

How many left?

$9 - 4 = 5$

5 candles

8 new cars

2 old cars

How many cars?

$8 + 2 = 10$

10 cars

Reinforcement

1. Provide each student with a picture to describe orally with an addition or subtraction number sentence. Use pictures from old workbooks and magazines.



Four girls,
Two boys,
Six children in all.
4 + 2 = 6

2. Provide sets of cards for matching.



3 + 2 = 5

3 red flowers and
2 yellow flowers

Enrichment

Have students attempt to write story problems to match a picture or a set card [000 ●●]. Use pages 85 and 86 as a model.

Problem Solving Activities

Assign Level 2, Unit 4

UNIT 4 LESSON 11

Objective A19

Add and subtract with sums to twelve.

Vocabulary

Addition names, subtraction names, fact family, sum

Materials

Addition Name Cards
Subtraction Name Cards
T Numeral Cards 0 to 6

Introducing the Lesson

Play a relay game to review addition and subtraction names for 10, 11, and 12. Divide the class into three or four teams. Provide each team with a mixed set of Name Cards, face down. Designate a space on the chalkboard for each team to record the names for 10, 11, and 12. Each team member comes up one at a time, takes a card from the team pile, and records the addition or subtraction name under the appropriate number. The student then goes back and tags a member of his or her team to go up and choose a card. When one team is finished, another team starts sorting all of their cards. Speed and accuracy should be considered in deciding the winning team.

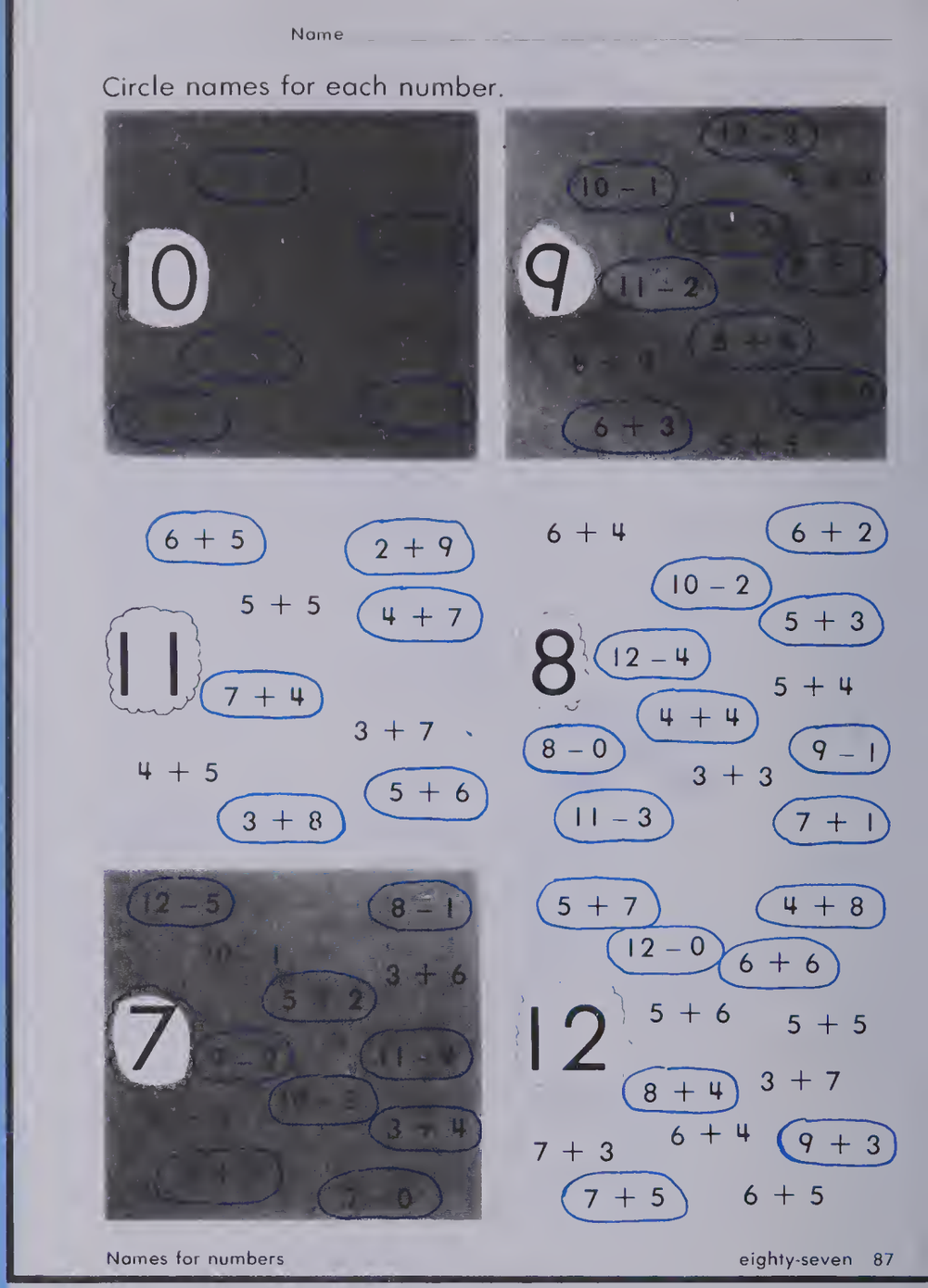
Teaching the Lesson

Review addition and subtraction names by showing the Name Cards and asking the students to identify them. 10 – 4 *is a name for six.*

Review adding three addends by putting the Numeral Cards face down on a table. Have students select three cards and find their sum. Mix the cards and repeat.

Write an addition sentence on the chalkboard. Ask a student to write the related subtraction sentence. Ask other students to write two more related sentences so that you have a *fact family.*

3 + 8 = 11	11 – 8 = 3
8 + 3 = 11	11 – 3 = 8



Using the Page

- Do the first set on page 87 with the students and ask, "Is four plus three a name for ten?"

Name _____

Add.

6 + 5 = 11	8 + 4 = 12	3 + 7 = 10	2 + 9 = 11	8 + 2 = 10	6 + 6 = 12

Subtract.

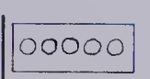
10 − 7 = 3	11 − 2 = 9	10 − 4 = 6	12 − 8 = 4	11 − 3 = 8	12 − 5 = 7

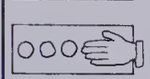
Add or subtract.

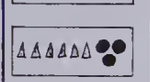
7 + 5 = 12	12 − 9 = 3	9 − 3 = 6	9 + 3 = 12	10 − 7 = 3	6 − 6 = 0

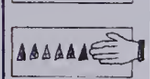
Add.

3 + 2 + 1 = 6	4 + 5 + 3 = 12	5 + 2 + 3 = 10


3 + 2 = 5


5 − 2 = 3


6 + 3 = 9


9 − 3 = 6

9 cats
3 run away.
How many cats are left?

9 − 3 = 6

6 cats are left.

6 red apples
4 green apples
How many apples?

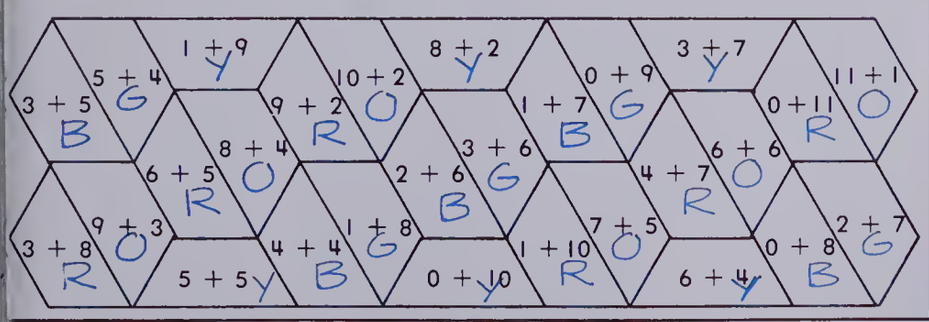
6 + 4 = 10

10 apples

Extra Practice **Worksheet A19**
Page 87

Add. Colour.

8 blue
11 red
9 green
12 orange
10 yellow



Reinforcement

1. Provide Addition and Subtraction Name Cards and paper plates marked 0 to 12 for individual students to use for sorting.

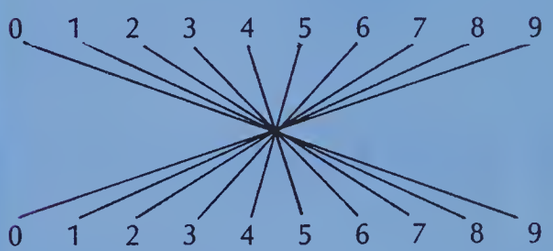
2. Using paper or the chalkboard, ask the students to write the numbers from 0 to 10 in a row. Then, have them join two numbers that add to ten. Repeat until all pairs are joined and 5 is left.



Follow the same procedure with the numbers from 0 to 11 written in a row and the numbers from 0 to 12 written in a row. Have the students join numbers adding to eleven and twelve.

Enrichment

Try this activity similar to the one above but use two rows and a ruler to join the sums. Use graph paper. Try various sums.



UNIT 4 TEST

Part 1: Adding to sums of 12.

Part 2: Subtracting from numbers to 12.

Part 3: Adding or subtracting to 12.

Part 4: Three addends.

Part 5: Related sentences.

Part 6: Addition and subtraction problems.

UNIT 5
Geometry

Theme: Winter Holidays

Lesson		Objective	Pages
1	G1	Identify and investigate rectangles and triangles.	89-90
2	G2	Identify circles and squares and investigate repeating patterns involving 2D figures.	91-92
3	G3	Identify balls and boxes and investigate patterns involving 2D and 3D figures.	93-94
4	G4	Identify and investigate cans, cones, and cubes.	95-96
5	G5	Investigate the faces of common solids.	97-98
6	G6	Investigate the number of edges and corners of common solids.	99-100
7	G7	Explore tiling and area using congruent figures.	101-102
8	G8	Recognize similar shapes and sort figures by colour and by number of sides.	103-104
9	G9	Identify symmetric figures and lines of symmetry.	105-106
10	G10	Draw symmetric figures.	107
Test		Geometry	108

Vocabulary

2-dimensional

figure
circle
repeating
symmetry
covering
triangle
size
pattern
fold
tile
rectangle
shape
sides
fold line
overlap
square
twin (congruent)
same shape (similar)
line of symmetry
grid

3-dimensional

solid
ball (sphere)
repeating
edge
cube
pattern
corner
cone
box (cuboid, prism)
flat
fold
can (cylinder)
face
roll

Materials

2-dimensional

a large collection of common geometric figures: rectangles, squares, triangles, circles



repeating pattern cards:



tiling shapes:
(for Lesson 7)

parallelogram



pentagon



hexagon



fish



squares



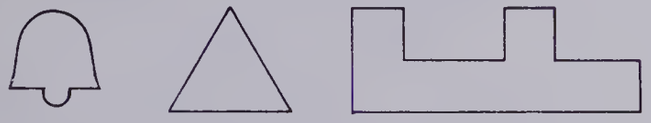
set of stars:



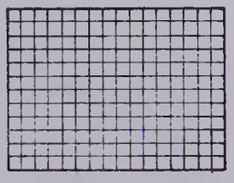
sorting set:
(for Lesson 8)



symmetric and non-symmetric figures:



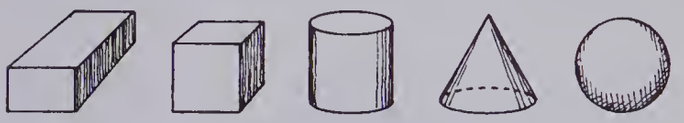
grid paper:



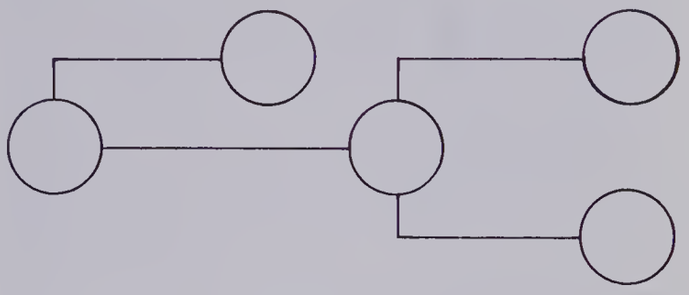
3-dimensional

a large collection of common geometric solids:

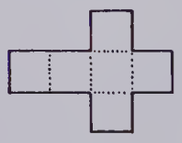
boxes cubes cans cones balls



sorting tracks
(for Lesson 5)



cardboard nets for cube:
(for Lesson 5)



construction paper
tape
poster paper
straws
chart paper
index cards
*MIRA*s
attribute blocks
mirror cards

scissors
rulers
Plasticene
mirrors
labels
projector
pattern blocks
geometry blocks

About This Unit

Unit 5 is a valuable resource for the planning and presentation of geometry in grade 2. The geometric objectives are organized in a sequence which is developmentally sound and instructionally manageable. It is recommended that the workbook assignments be used as follow-up exercises. The formative experiences should consist of active manipulation with 2D and 3D materials, teacher demonstrations, and group discussions. The teacher's guide can be of great assistance in developing these formative experiences: *Introducing the Lesson* and *Teaching the Lesson* provide practical suggestions for demonstrations and discussion; the *Reinforcement, Enrichment,* and *Ideas* sections provide suggestions for a wide variety of activities, including arts and crafts, construction projects, work cards, and games.

Unit 5 begins with a review of four basic 2D figures: triangle, square, rectangle, and circle. Next, five geometric solids are introduced using common names: can, cone, box, cube, and ball. Teachers have the option of introducing more technical terminology: *cylinder* for can, *sphere* for ball, and *cuboid* or *prism* for box. Knowledge about 2D figures is applied to solids with the investigation of faces, edges, and corners. The remainder of the unit develops intuitive understanding through explorations of other topics in 2D geometry. Activities involving tiling and covering to find area provide informal exposure to congruence. The discussion of similarity of 2D figures makes use of the counting of the sides of a 2D figure. The final lessons in the unit involve the identification and construction of symmetric figures.

Mathematics educators have noted that geometry in the primary grades can serve as a natural vehicle for developing problem solving skills. Unit 5 provides substantial opportunities for experiencing problem solving. Problem solving techniques presented in this unit include *repeating patterns* in Lessons 2 and 3, *classification* in Lessons 4 and 8, *guess and test* in Lesson 7, and *working with pictures* in Lessons 1 and 10. Preparing grade 2 students for problem solving requires meaningful discussion, time, and patience. A minimum of 16-20 periods are necessary to complete the topics in Unit 5 if activities and worksheets are used as recommended.

Ideas

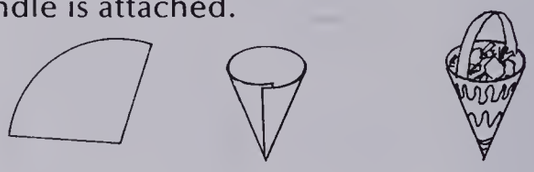
The theme of this unit is *Winter Holidays*. Teachers may wish to take advantage of the workbook illustrations to further the discussions that naturally occur prior to winter holidays. Geometry crafts ideas are suggested in the *Reinforcement* and *Enrichment* sections of each lesson. Further activities and games are discussed below.

Tree Ornaments

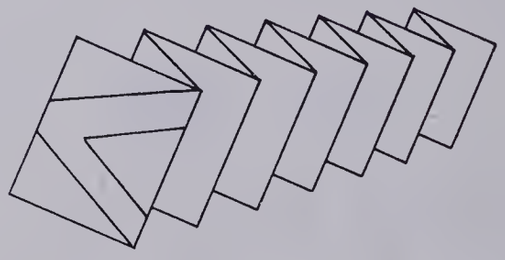
Egg Carton Bells: Cut egg cartons into component cups. The cups can be decorated with glitter and stars. A pipe cleaner forms the hook and clapper.

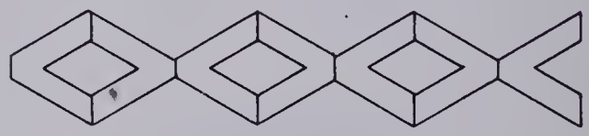


Candy Cones: Cones are made from near-quarter-circle figures. A construction paper handle is attached.

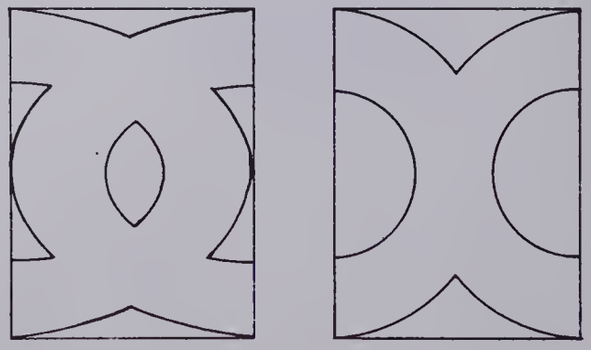


Chains Galore: Fold and cut as shown a strip of paper about 6 cm wide.



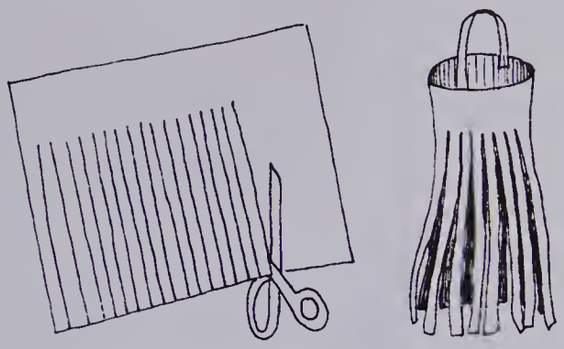


Other designs:

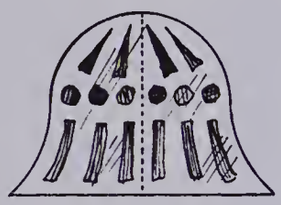


Allow students to investigate their own patterns.

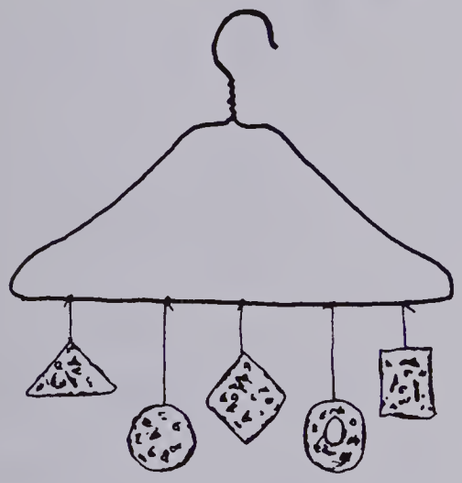
Fringed Foil: Cut slits in a rectangular piece of foil. Wind foil tightly and staple.



Stained Glass Bauble: Cut two congruent symmetric shapes from waxed paper. Arrange small pieces of coloured tissue between the waxed paper pieces and seal with a warm iron.

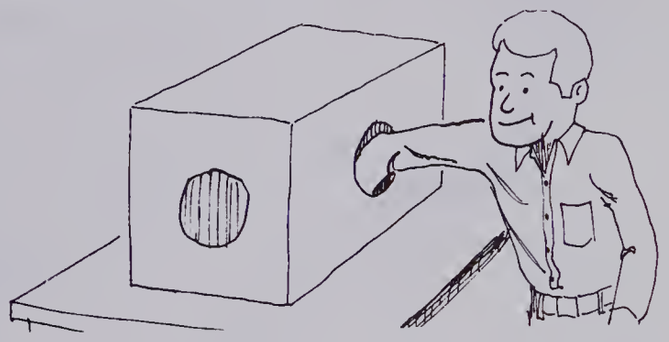


Doorway Decorations: Baubles are hung from a coat hanger wrapped in colourful tinfoil.



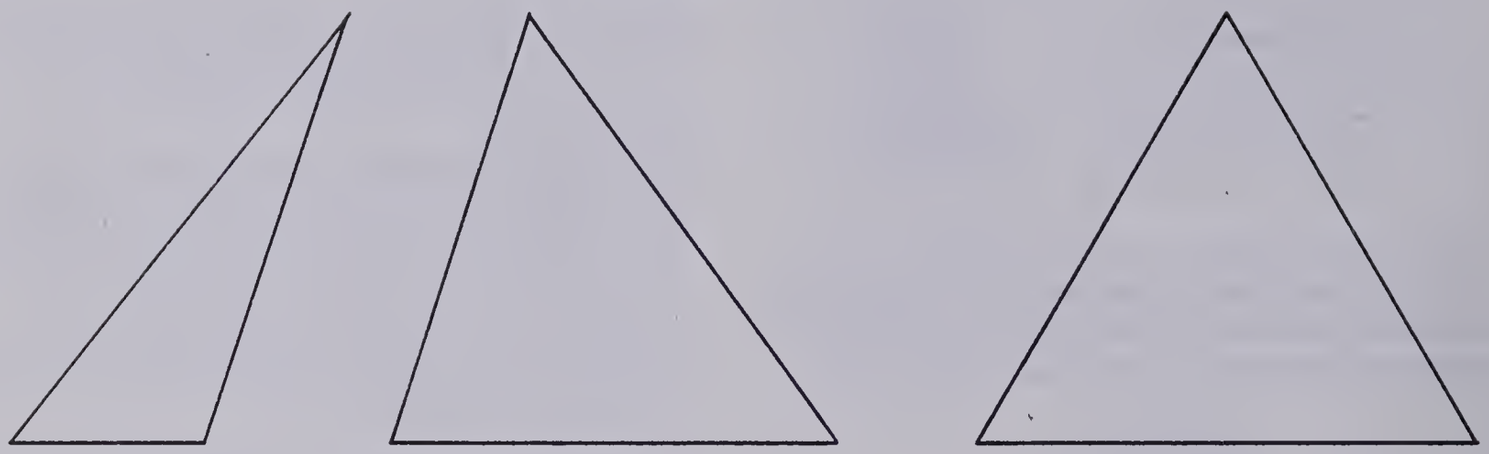
Solids Games

Game One:
A blindfolded player must determine the kind of solid by touch.
Game Two:
The five solids are enclosed in five identical shoe boxes. The player must guess which solid is in each shoe box by analysing how it rolls.
Game Three:
Four hand-size holes are cut into a large box. A set of solids is placed within the box. A set of cards with names of the solids (can, box, etc.) is laid face down. As a card is turned up, four students reach through the holes and try to locate the solid. When someone pulls it out the next card is turned up.

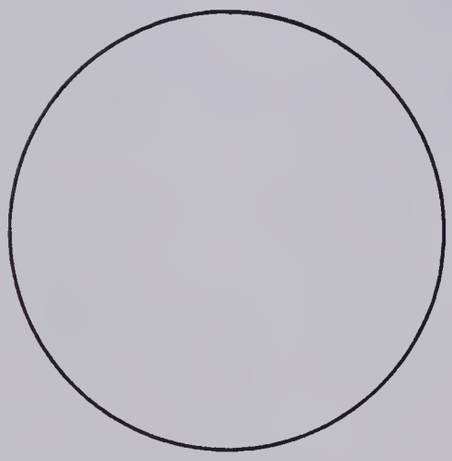


Common Figures

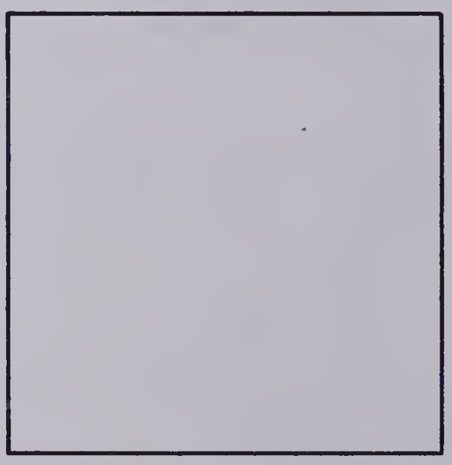
Triangles



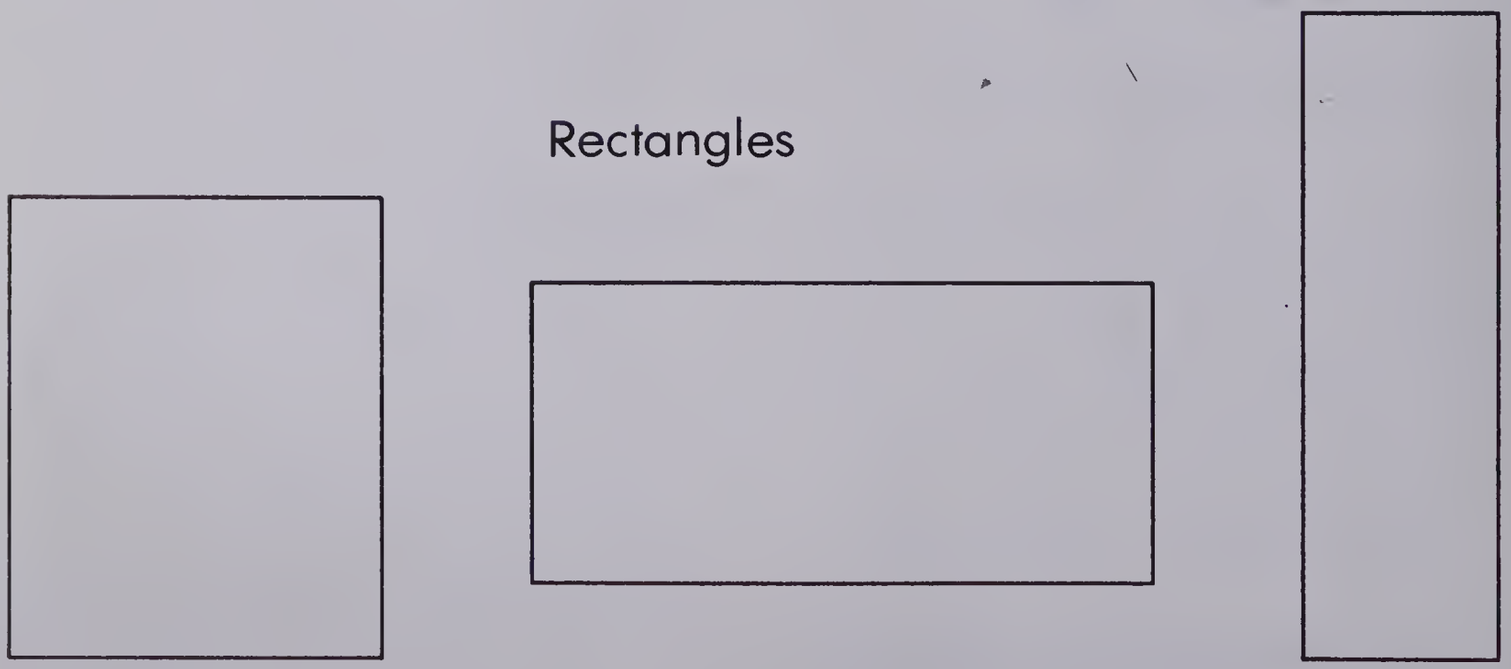
Circle



Square

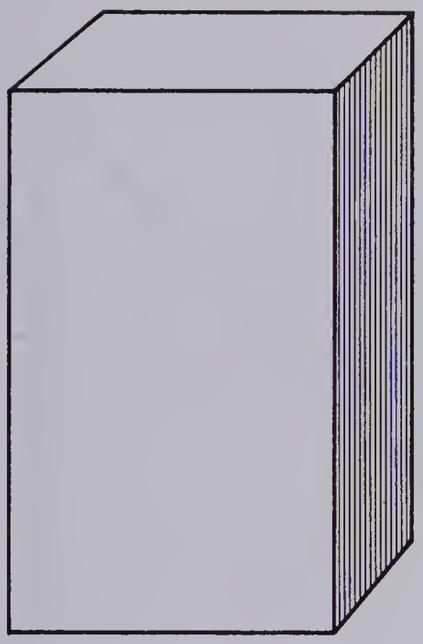


Rectangles

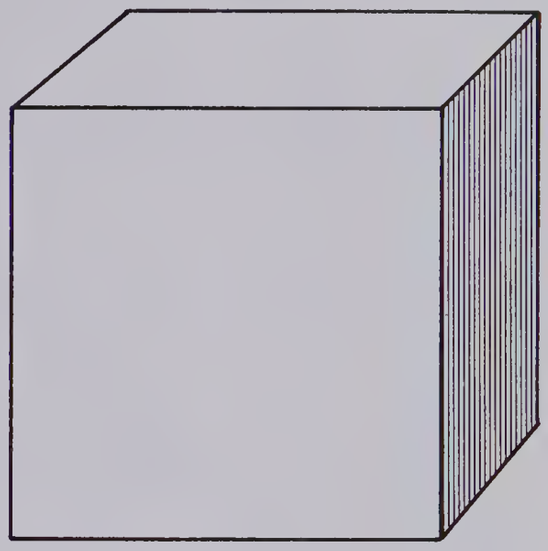


Common Solids

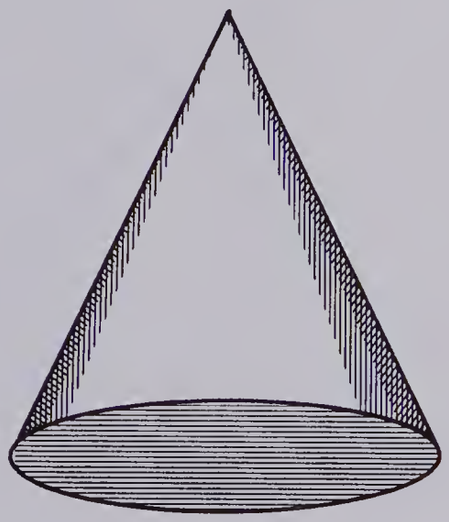
Box
(Cuboid)



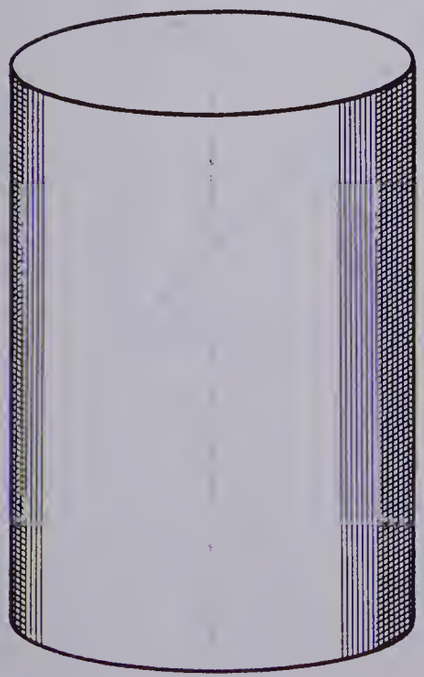
Cube



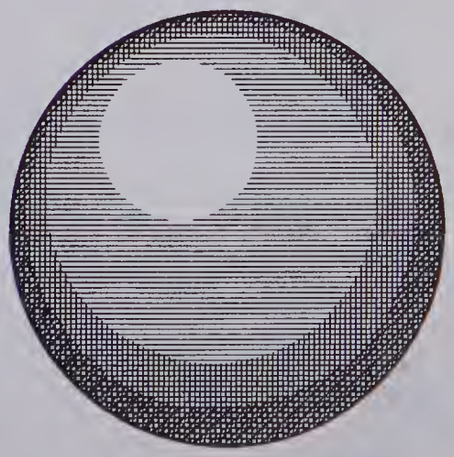
Cone



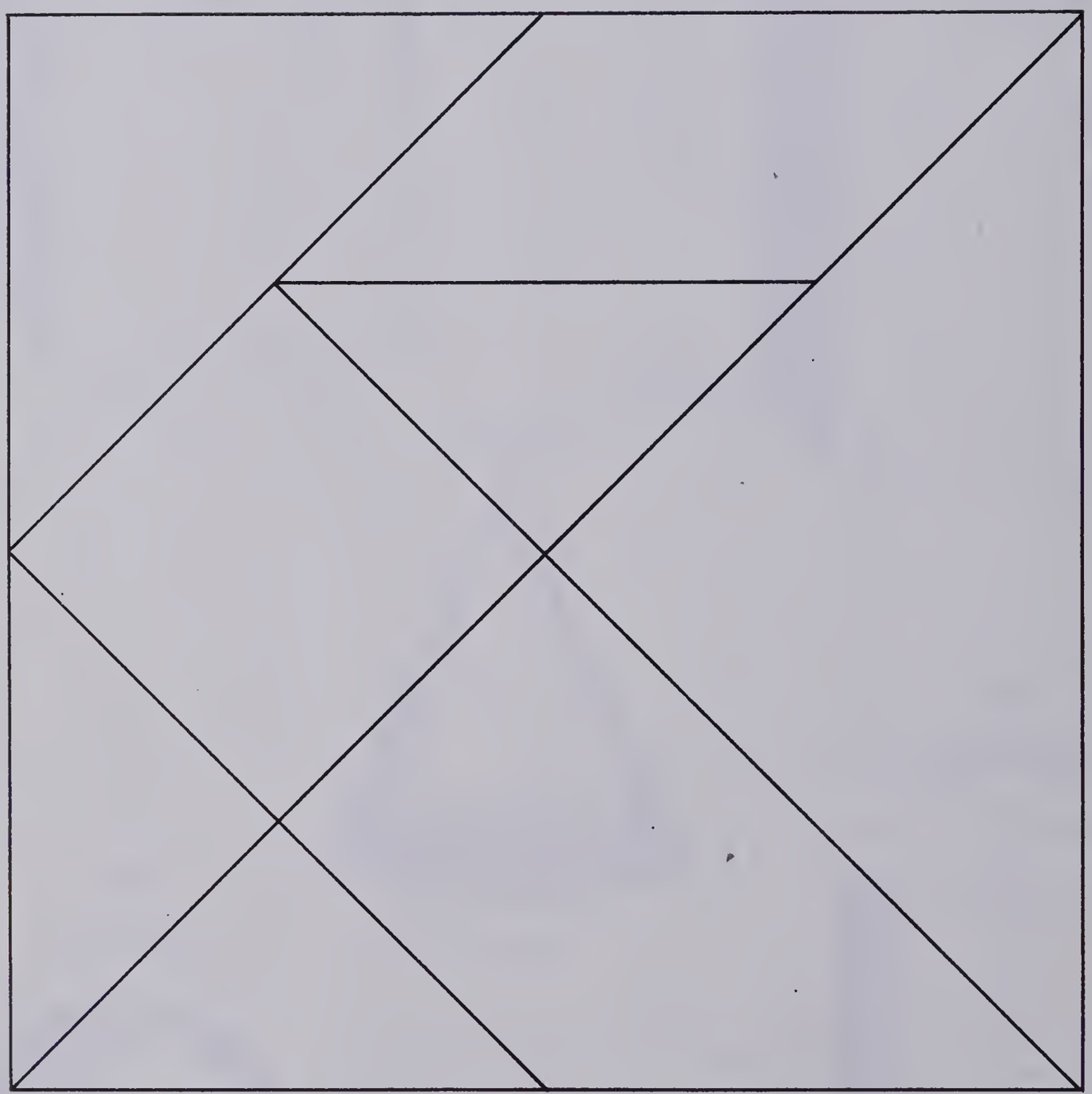
Can
(Cylinder)



Ball
(Sphere)

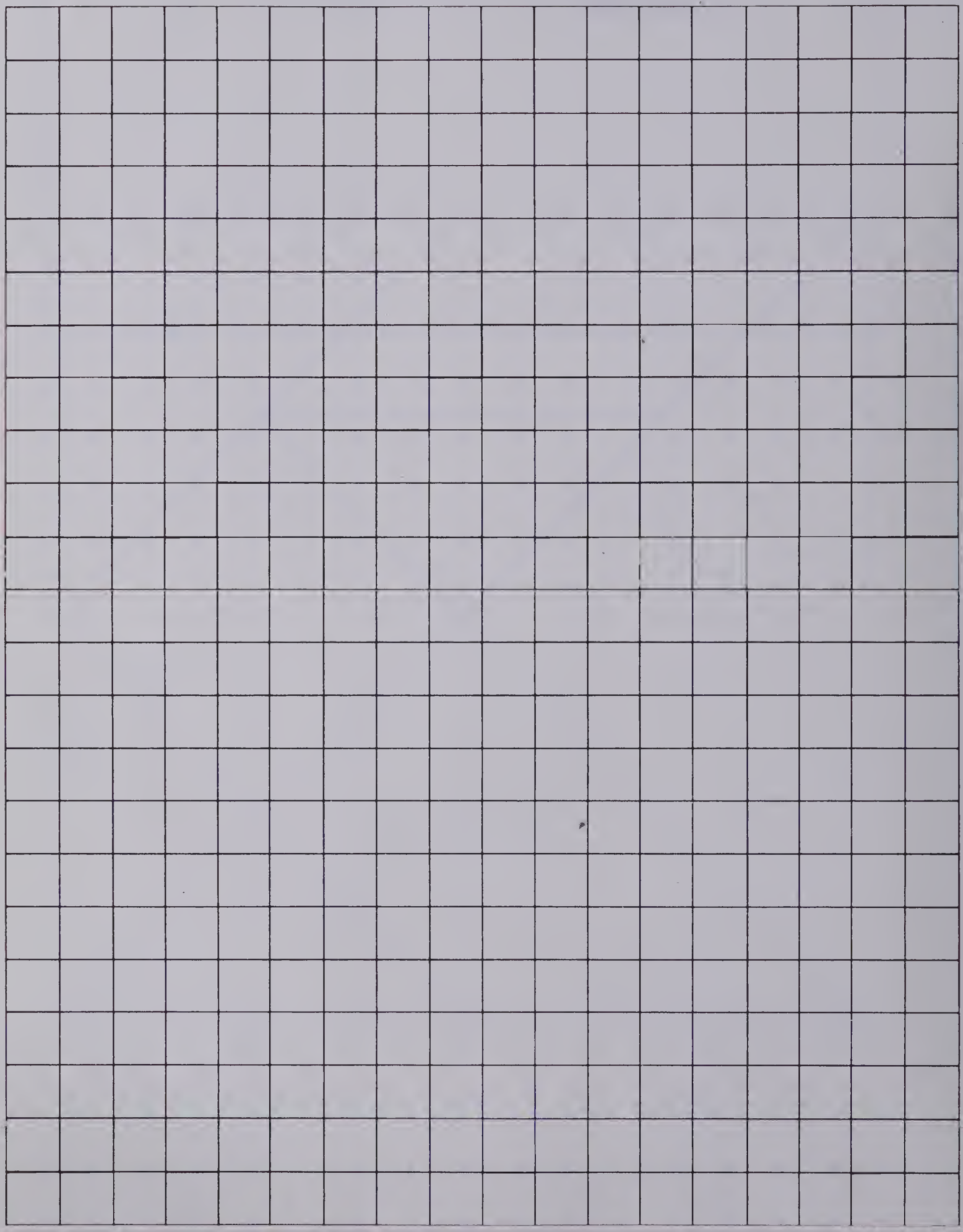


Tangram Puzzle



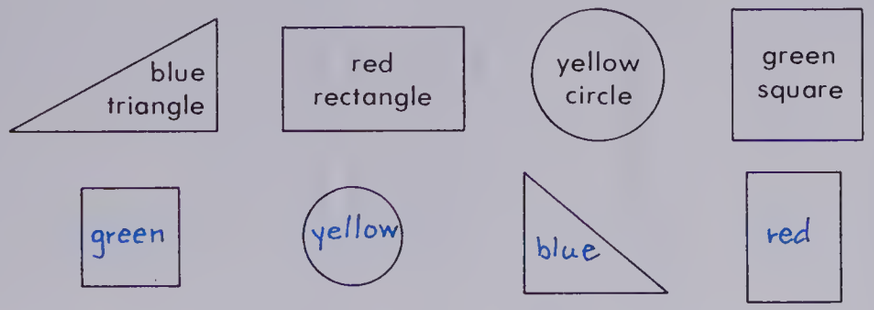
Copy me!



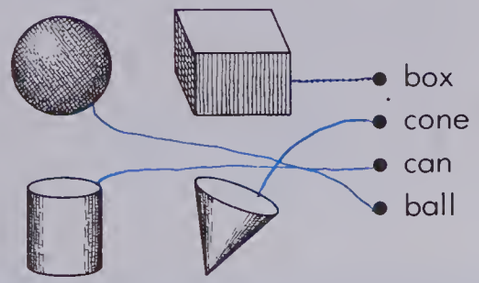


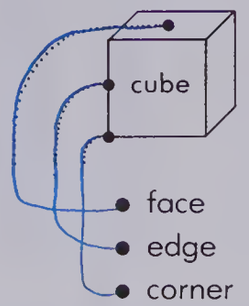
Pretest **Unit 5**

Colour the same kinds alike.

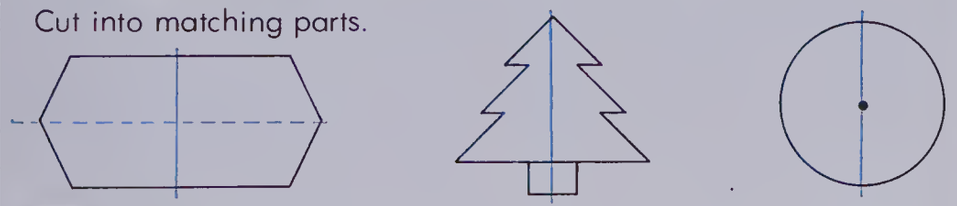


Match.

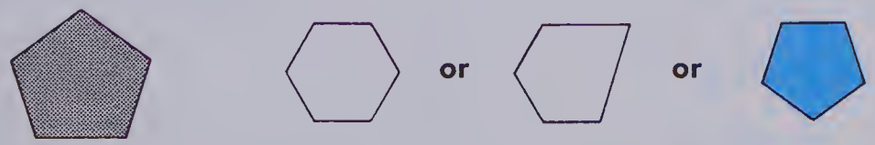




Cut into matching parts.

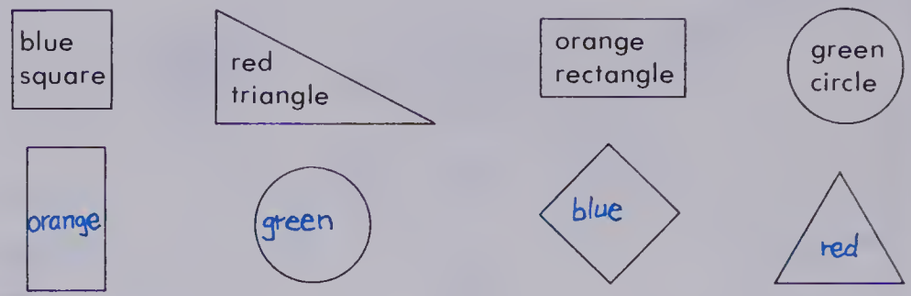


Colour the same shape.

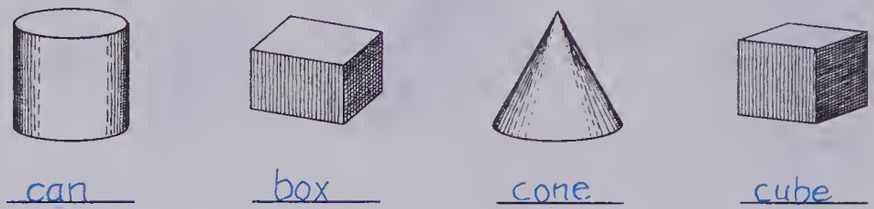


Post-test **Unit 5**

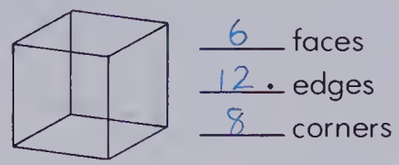
Colour the same kinds alike.



Name these. (cone, cube, box, can)

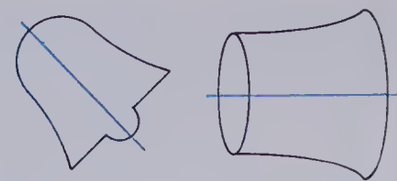


A cube has:



6 faces
12 edges
8 corners

Draw the line of symmetry.



Colour the twin.



Colour the same shape.



UNIT 5 LESSON 1

Objective G1

Identify and investigate rectangles and triangles.

Vocabulary

Rectangle, triangle, twin, look-alike

Materials

Construction paper cutouts: at least 10 different rectangles and 10 different triangles

Transparent tape or paste

Introducing the Lesson

Ask the students to recall the name for a brightly coloured rectangle. Spell "Rectangle" on the board. Display several rectangles. Review that a rectangle has 4 sides and 4 corners.

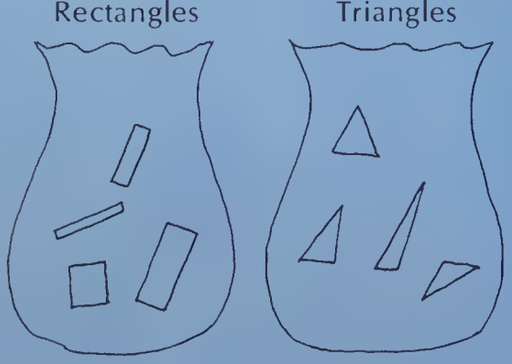
Ask the students to recall the name for a triangle cutout. Spell "Triangle" beside "Rectangle". Display several triangles. Contrast triangles with rectangles. "Triangles have 3 sides and 3 corners."

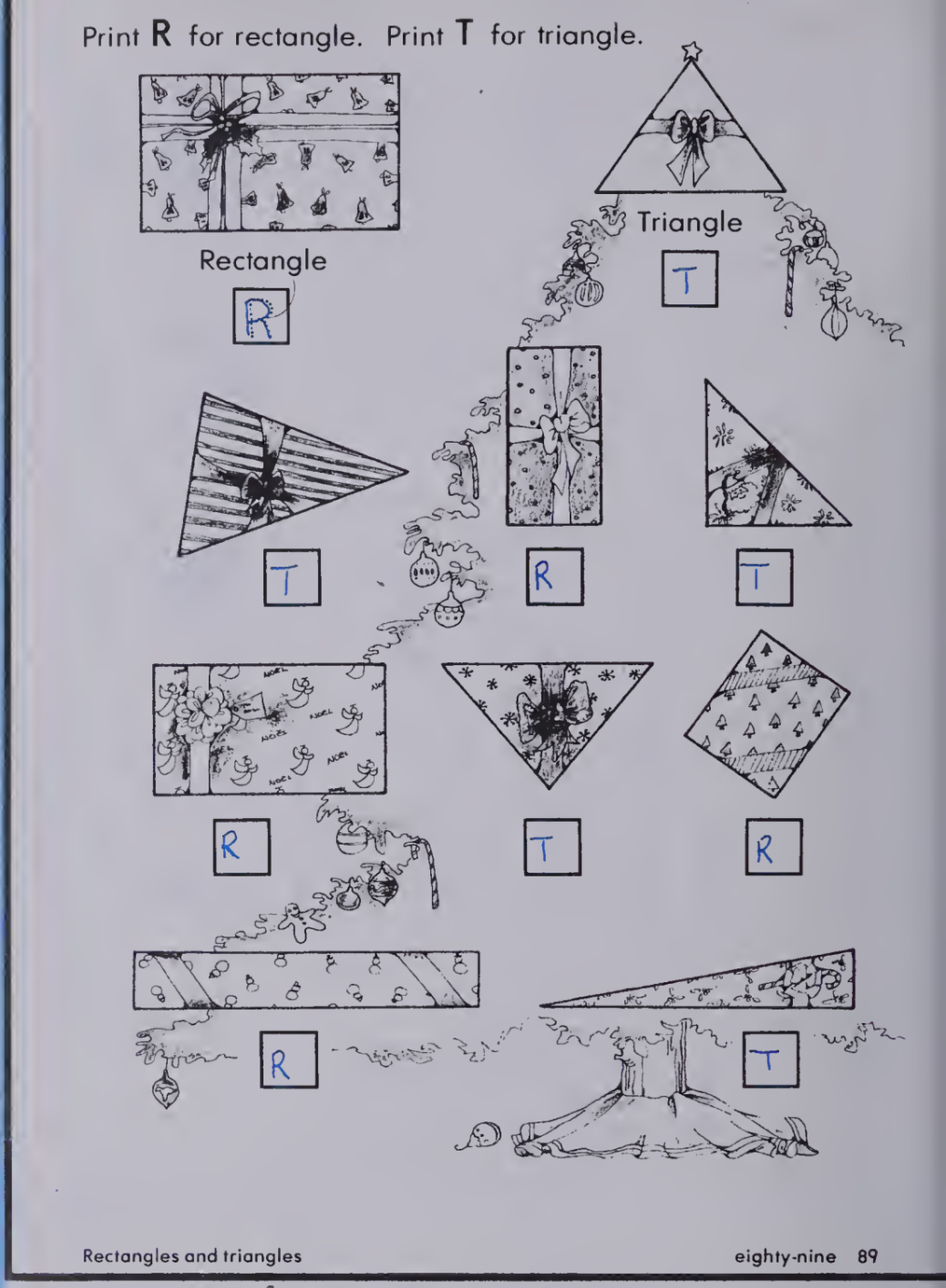
Have several students locate other rectangles and triangles in the room. "Who can find a triangle and put it under the name *triangle*?"

Teaching the Lesson

Display a triangle. Draw several triangles beside it with only one being its *twin* (look-alike). Challenge someone to locate the first triangle's twin. Repeat this demonstration using a variety of triangles and rectangles.

Hold up a figure (triangle or rectangle) and ask the students to name it. Draw two bags on the board labelled *triangles* and *rectangles*. Put (tape) the figure "in" the correct bag. Repeat.





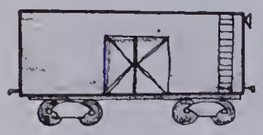
Rectangles and triangles

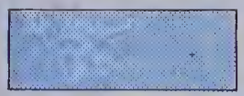
eighty-nine 89

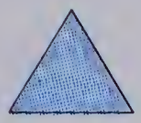
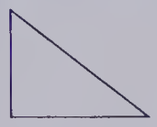
Using the Pages

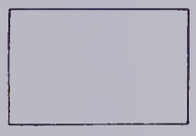
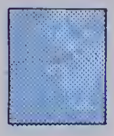
- Students must be able to recognize and name rectangles and triangles. Discuss how the workbook asks the student to use [T] beneath triangles and [R] beneath rectangles. Review initial consonant sounds, if necessary.
- The exercise on page 90 should be approached as a drawing and colouring activity. Challenge students to complete the second twin (look-alike, congruent figure) with reasonable care.

Colour the twin.

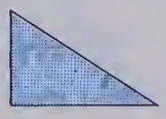


or




or


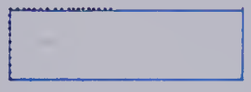


or




or


Draw a twin.



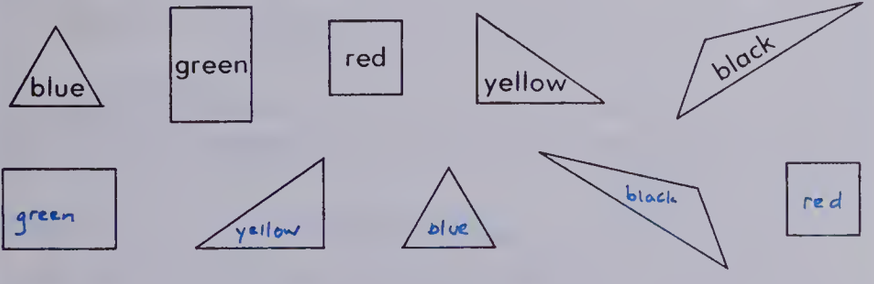





Extra Practice **Worksheet G1**

Pages 89-90

Make the twin the same colour.



Print.

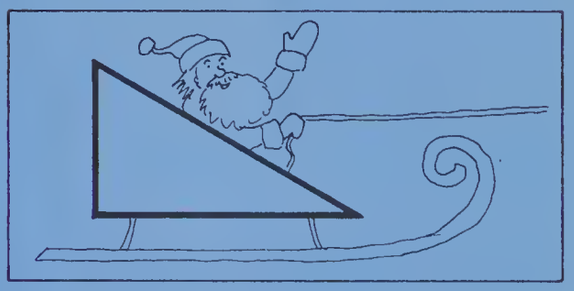
A rectangle has 4 sides.

A triangle has 3 sides.

Reinforcement

Workcard

1. *Drawing Workcards.* Pick a picture card. Draw and colour a twin. Provide a collection of simple drawing workcards which feature common 2D figures such as triangles, rectangles, circles, and squares.

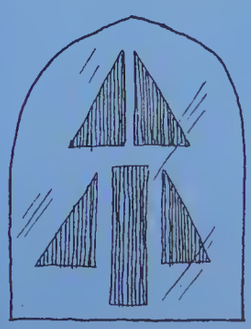
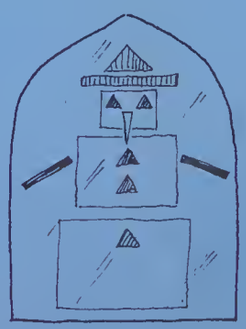


2. Introduce the Concentration game, *Geometry Twins*. Prepare 8 different pairs of matching figures on 16 cardboard playing cards. After mixing the cards, place them face down in a square or rectangular array. In turn, each player turns up two cards. If the cards match, they are kept and another turn is taken. If the cards don't match, they are turned back over where they are. Play continues until all the cards have been won. As students become more proficient, add more geometry twins to the deck.

3. Encourage students to label rectangles and triangles (and later squares and circles) in the classroom.

Enrichment

As an art lesson have each student design a stained glass window using coloured tissue paper upon waxed paper. Restrict the kinds of paper shapes that can be cut to triangles and rectangles. With the students, prepare a list of possible scenes (trees, snowman, castles,...). Small strips of transparent tape can be used to hold the tissue paper shapes in place while sealing the waxed paper with an iron.

UNIT 5 LESSON 2

Objective G2

Identify circles and squares and investigate repeating patterns involving 2D figures.

Vocabulary

Circle, square, rectangle
Repeating pattern
Shape, colour, size

Materials

Construction paper cutouts of squares and circles
A set of repeating pattern cards

Introducing the Lesson

Displaying a variety of circles, ask for the shape name. Print "*Circle*" on the board. Note that the "c" sounds like an "s" because it is followed by an "i". Have students try to describe the properties of a circle by showing contrasting shapes. Encourage intuitive and contrasting suggestions: *A circle is rounded. A circle has no corners; it is smooth. This is not a circle because it's a funny shape, it's not even.*

Display a variety of squares and ask for the shape name. On the board, print "A square is a kind of rectangle." By folding or measuring, discover that a square has 4 equal sides.

Introduce the following diagrams to discuss and sort squares and rectangles.

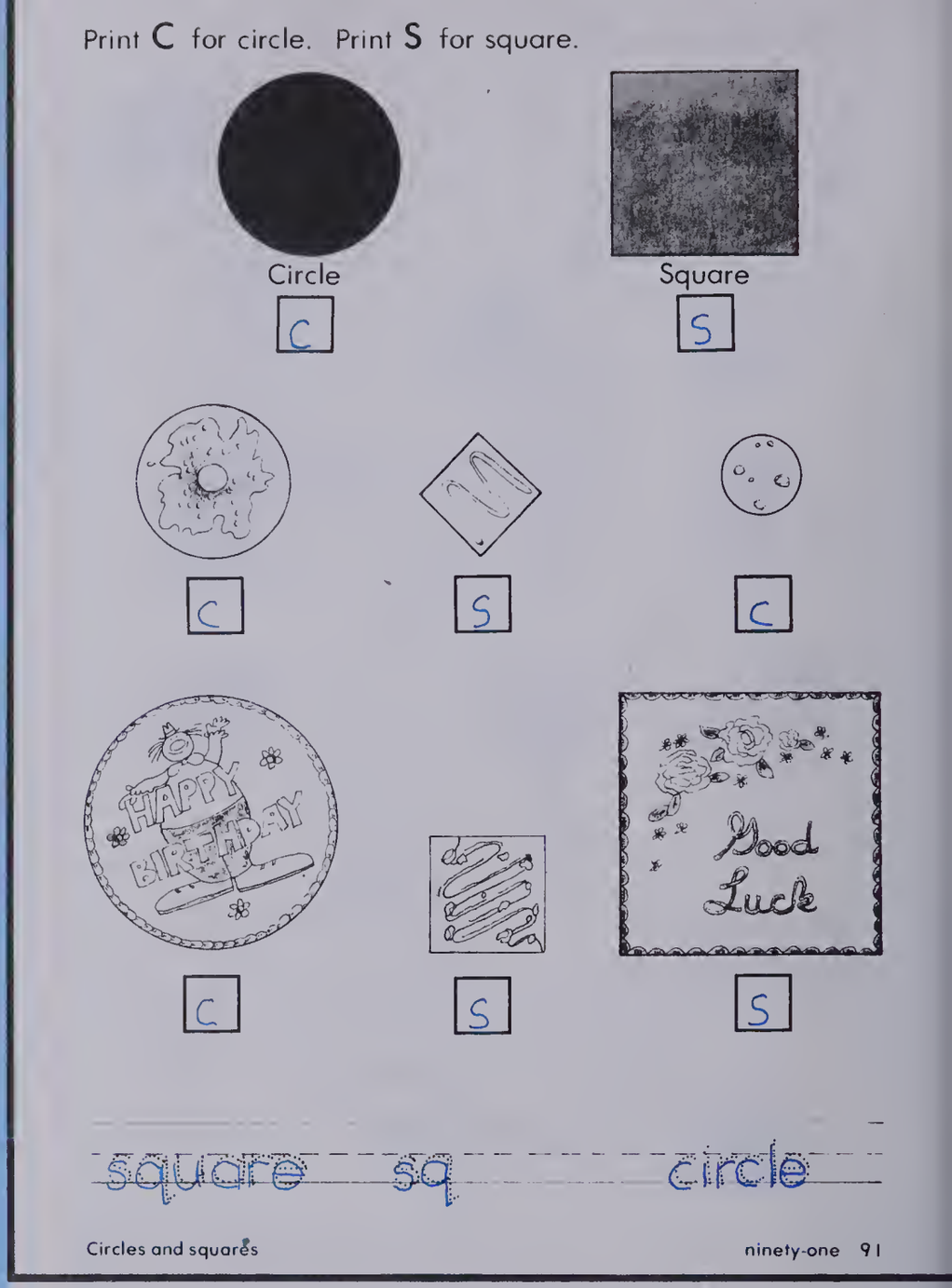
children	
boys	girls

rectangles	
squares	not squares

Teaching the Lesson

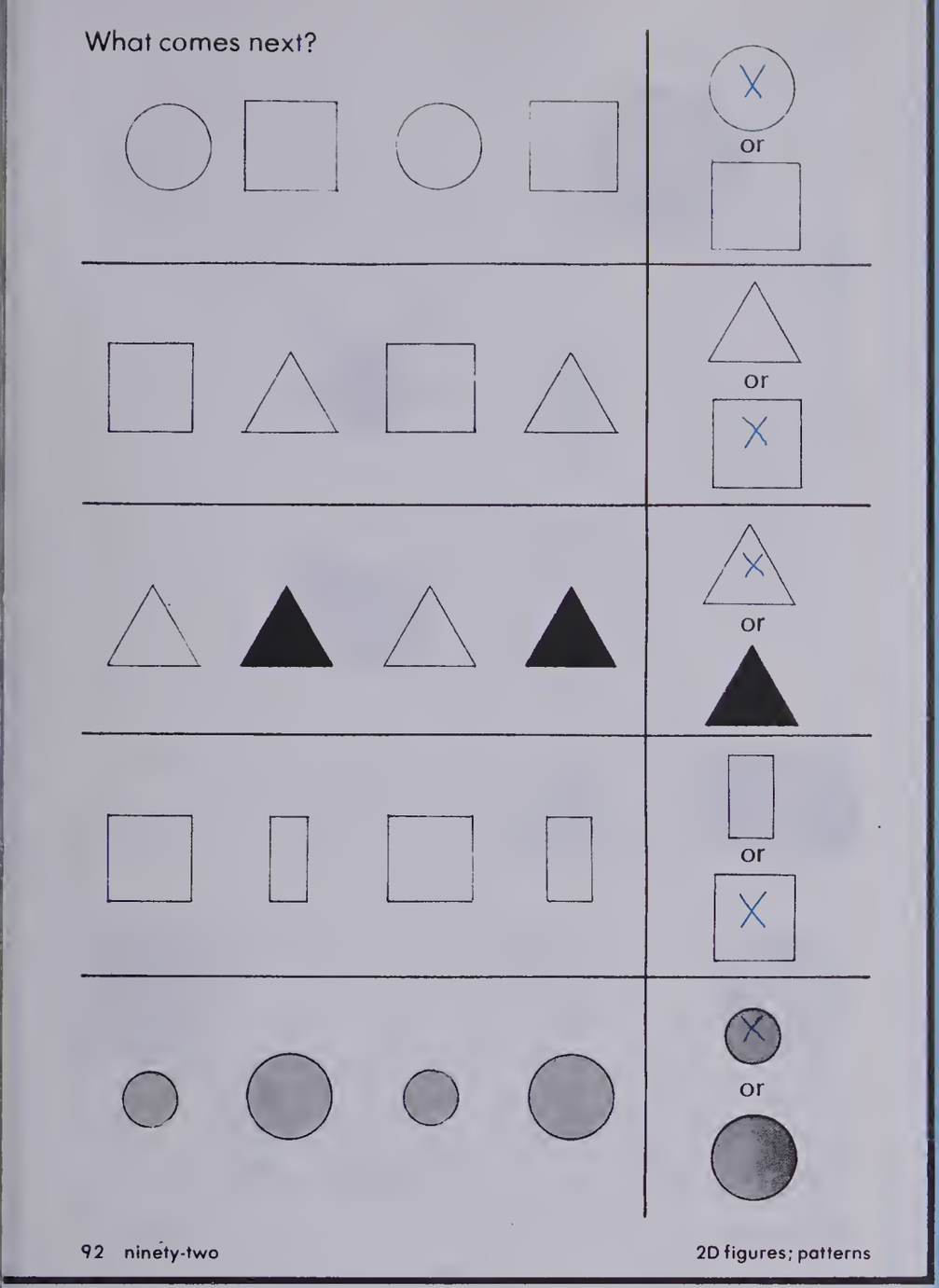
Use a set of cards (or a chalkboard display) to discuss simple repeating patterns (of the form ABABAB...). Note that altering shape, size, or colour may create patterns.

shape	○ □ ○ □	What's next?
shape	□ \| □ \|	What's next?
size	○ ○ ○ ○	What's next?



Using the Pages

- You may wish to assign a repeating pattern activity following the first lesson and delay use of the workbook pages until the next day. Appropriate activities are described in the *Enrichment* section.
- The exercise format for page 91 is similar to that found in the previous lesson. Remind students to complete the printing at the bottom of the page.
- On page 92 the students are to choose the figure which continues the repeating pattern. The properties of shape, size, and colour are used. Activities requiring construction by students are presented in the *Enrichment* section.

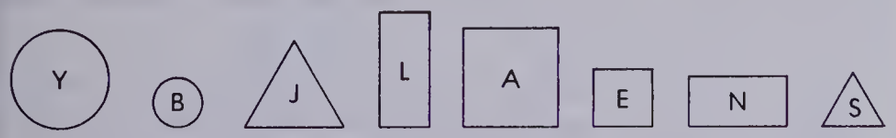


92 ninety-two

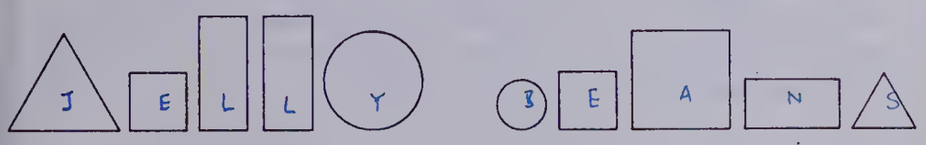
2D figures; patterns

Extra Practice

Worksheet G2
Pages 91-92



What beans won't grow from seeds?



Reinforcement

1. Expand your collection of simple drawing workcards. (See page 90.)

2. Continue to encourage students to label 2D shapes in the classroom. Provide paper and tape.

Enrichment

Not only do students enjoy constructing repeating patterns, but the experience is invaluable. The concept of pattern is a unifying thread which runs through all areas and levels of mathematics.

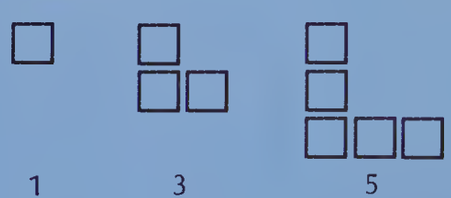
Page 92 in the workbook presents the simple pattern ABABAB. In the next lesson, more complex patterns are introduced. (AABAAB..., AABBAABB..., and ABBABB...)

1. Group activity: Students use their bodies as percussion instruments to create repeated rhythm patterns (clapping, stamping, clicking, etc.).

2. Group activity: Students move in physical education class to create repeated movement patterns (hopping, jumping, skipping, rolling, etc.).

3. Individual activity: Students arrange or draw 2D figures to form repeated geometric patterns. Particularly useful materials are pattern blocks and stickers, attribute blocks and stickers, and the dot graph paper included at the beginning of this unit.

4. Individual activity: Patterns may grow as well as repeat. Here are examples of growing geometric patterns that can be related to arithmetic. A very useful primary level resource relating geometric and numeric patterns is *Pattern Factory* from Creative Publications.





UNIT 5 LESSON 3

Objective G3

Identify balls and boxes and investigate patterns involving 2D and 3D figures.

Vocabulary

Solid
Ball (sphere), rounded
Box (cuboid, prism)
Repeating pattern

Materials

4 or more spheres (golf or table tennis balls)
4 or more cuboids (chalk boxes or crayon boxes)
Cardboard circles and squares

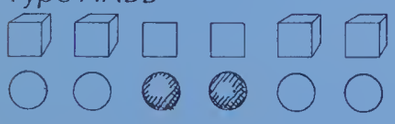
Introducing the Lesson

Display a ball and a cardboard circle. Ask the students to describe how the ball (sphere) and circle are alike and how they are different. *They are both round. They both roll. Neither has corners. The circle is flat and the ball isn't.* Informally introduce the term **solid** as an object that doesn't lie flat (see Lesson 5). Display a box and a cardboard rectangle. Have the students discuss the similarities and differences. *Both have sides and corners. The rectangle is flat but the box stands up. The box seems to be made out of rectangles.* Identify several other balls and boxes in the classroom.

Teaching the Lesson

Using balls, boxes, circles, and squares, challenge students to determine the next two items in the repeating patterns found below. Carefully discuss the nature of each pattern.

Type AABB



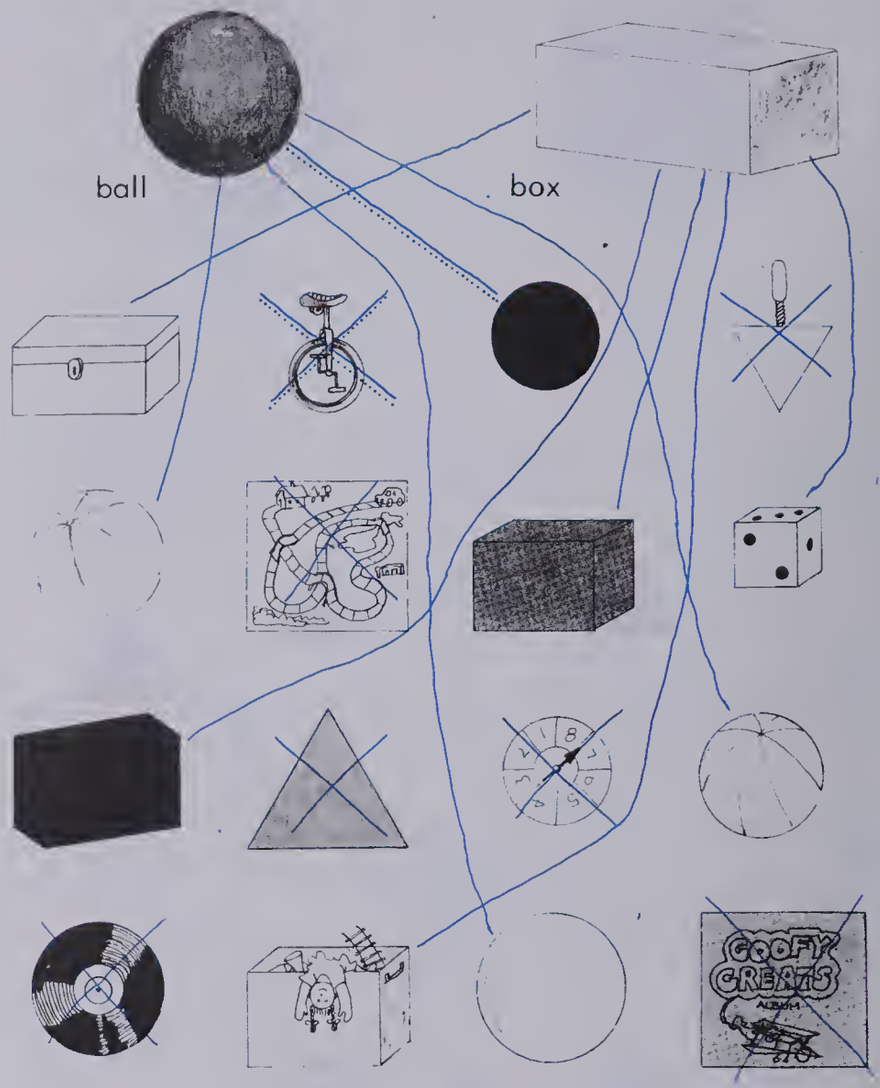
Type AAB



Type ABB



Match the solids.



ball b box b

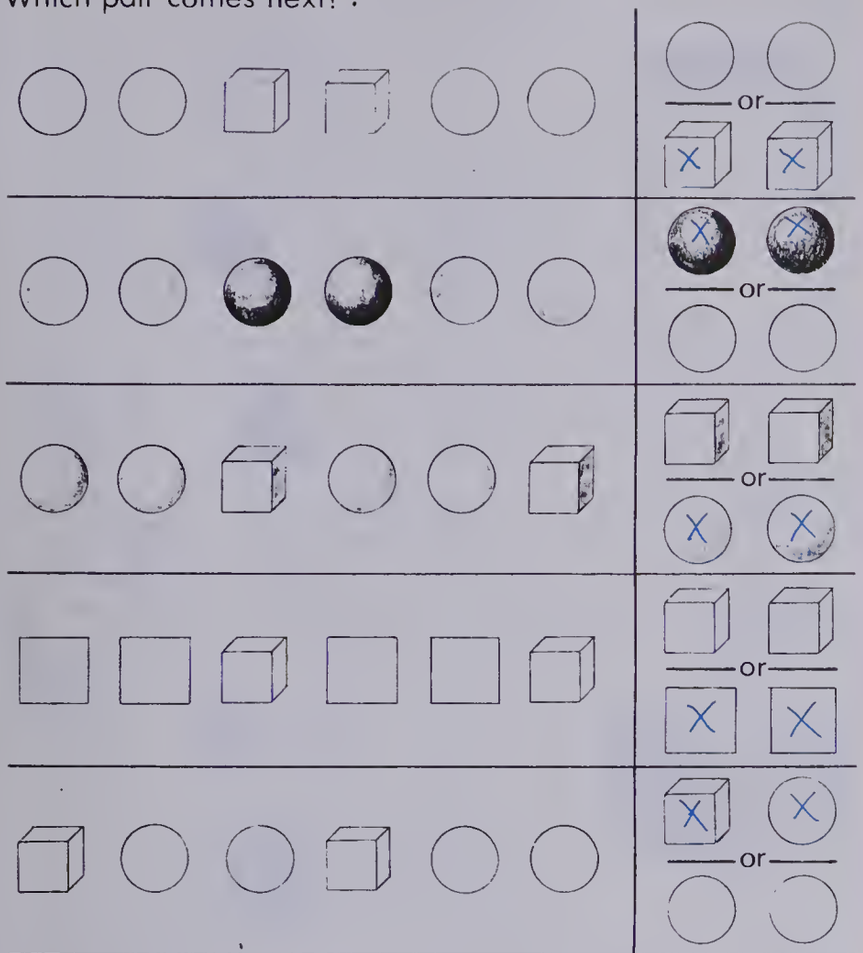
Balls and boxes

ninety-three 93

Using the Pages

- The kinds and names of items on page 93 may be reviewed. Only balls and boxes should be matched to the examples above; other items should be crossed out.
- Page 94 contains three types of repeating patterns introduced in the lesson. Students having difficulty should be encouraged to build the patterns using concrete objects. As with the previous lesson, it is recommended that page 94 not be assigned until group and individual patterning activities have been utilized. (see *Enrichment*, page 92.)
- *Looking Back* on page 94 provides a quick review of addition facts to sums of 12. Provide extra drill at this stage if the results of the review warrant it.

Which pair comes next? .



LOOKING BACK

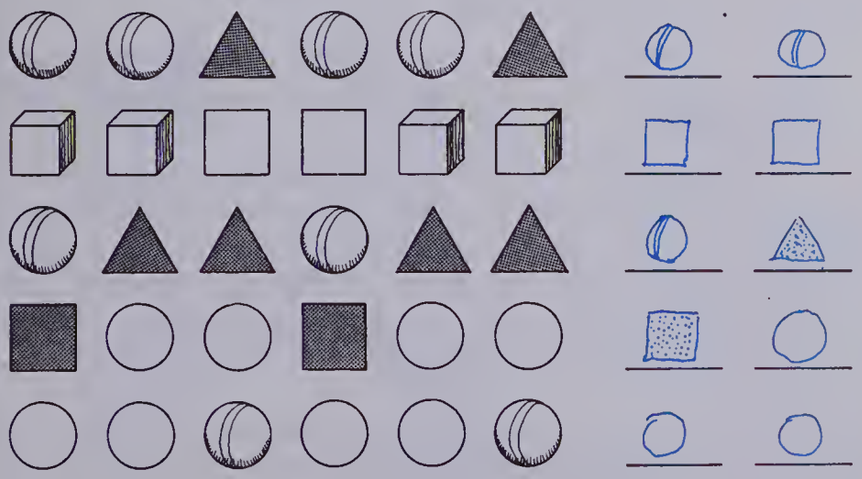
Add.

6	3	6	5	8	4
+ 4	+ 9	+ 5	+ 7	+ 3	+ 6
10	12	11	12	11	10

Extra Practice

Worksheet G3
Pages 93-94

Draw the next two.



Reinforcement

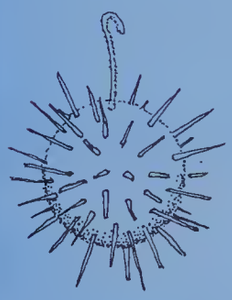
1. Encourage students to label 3D objects in the classroom that suggest a ball (sphere) or box (cuboid, prism). Provide tape and construction paper.

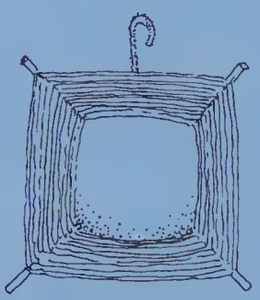
2. Challenge the class to find at least 25 different pictures from catalogs that suggest balls (spheres) and 25 that suggest boxes (cuboids, prisms). Have the pictures neatly pasted on the appropriate score card.

BOX SHAPE	BALL SHAPE

Enrichment

As a crafts project, construct baubles from styrofoam balls. Begin by spray painting the balls in silver or gold. After drying them overnight, decorate them with patterns using coloured toothpicks. Alternatively, pierce each ball with wooden skewers and weave coloured yarn between the skewers. Insert a pipe cleaner to act as a hook.





Problem Solving Activities

Assign Level 2, Unit 5

UNIT 5 LESSON 4

Objective G4

Identify and investigate cans, cones, and cubes.

Vocabulary

Can (cylinder), cone, cube
Roll, circle, square, box, underline

Materials

A collection of cans, cones, cubes, and boxes
Sugar cube, number block cubes, ice cream cone, tin cans
Chart paper and 3D name tags

Introducing the Lesson

Distribute sugar cubes to all the students. With the help of the class, print "sugar **cube**". Ask for descriptions of a cube and record these on chart paper: *It is a kind of box. It has lots of corners.* Let several students roll the sugar cubes around in their mouths as you repeat the request: *It is flat in some places and sharp in others. It doesn't roll like a ball.*

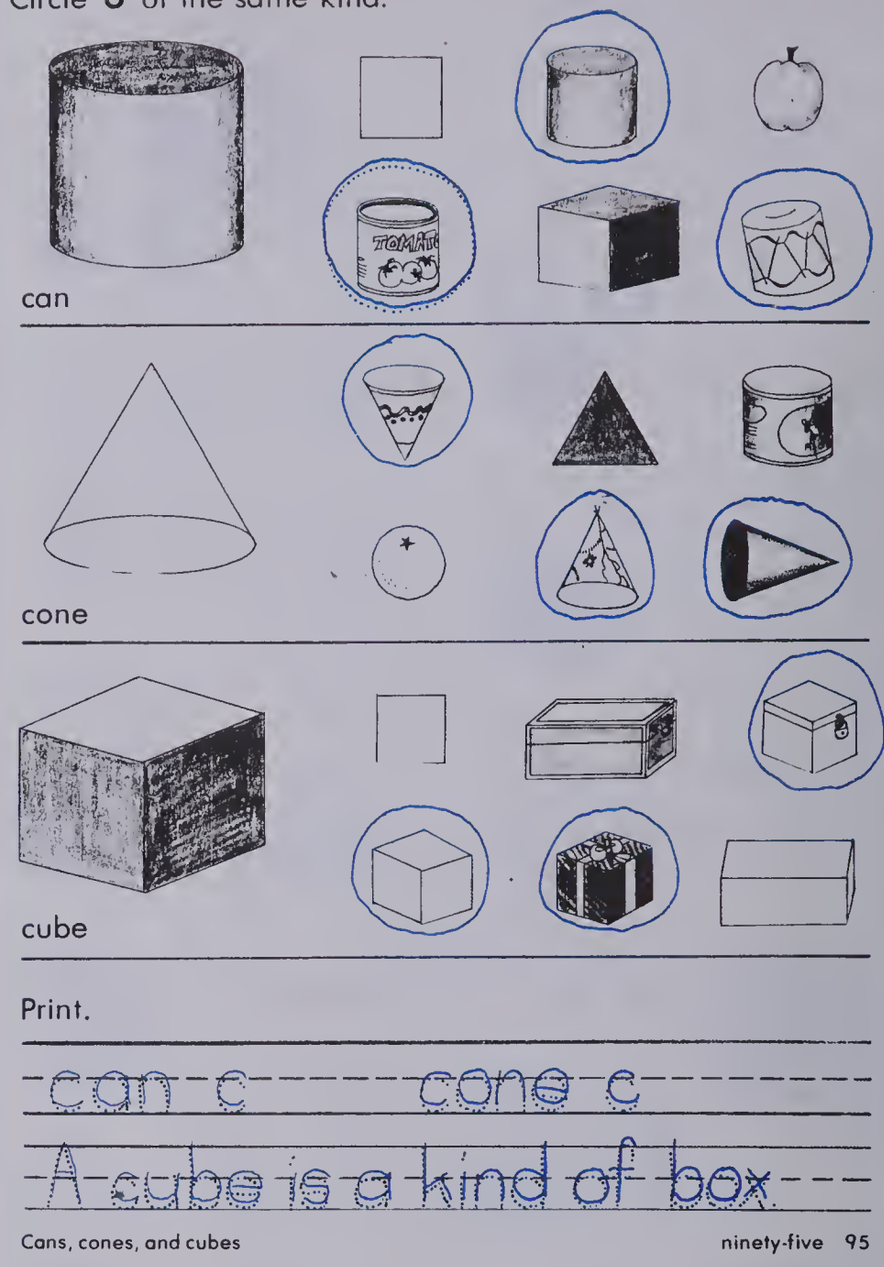
Teaching the Lesson

Place several boxes and cubes before the students. Print "A cube is a special kind of box." Make a list contrasting the boxes that are cubes with those that are not.

BOXES

cubes	not cubes
1. They all have the same shape as a sugar cube, but come in different sizes.	1. They come in different shapes and sizes.
2. They are as tall and wide as they are long.	2. They can be longer than they are wide or tall.

Show an ice cream cone (cone shaped) and, with the students' help, print "ice cream **cone**". Hold up an example of a cone that is not open at the end. Ask for descriptions of the cone and record these on chart paper: *It's both rounded and flat. It has a circle on it. It has a sharp point.* Ask someone to roll the cone and describe its movement. Summarize the students' observations: *It rolls around and around. It rolls in a circle. The point stays at one place.*



Using the Pages

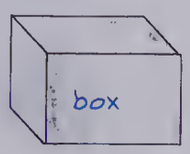
- Before assigning the workbook pages, you may wish to pursue the activities found in the *Reinforcement* section. Pages 95 and 96 may then be used as a follow-up.
- On page 95, the students are to find the 3 examples of the can, cone, and cube. The printing at the bottom of the page is to be completed.
- It is recommended that the Reinforcement activities be used prior to the assignment of page 96. Carefully read and discuss the directions on page 96. This is a classification, problem-solving exercise which will challenge most students. Demonstrate the actions asked for: *underline, circle, print BOX under,* and *make a square.* Note that four of the solids will need to be marked twice.
- *Looking Back* on page 96 provides a quick review of subtraction facts to 12. Assign additional practice if the results of this review seem to warrant it.

1. Underline those that roll.

 Circle those that roll **only** in a circle.

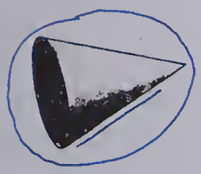
2. Print **BOX** under **3** boxes.

 Square the cubes.



can

cone









cube
box

ball

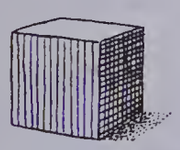
LOOKING BACK

Subtract.

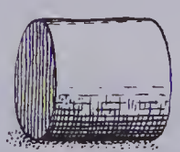
12	11	12	10	11	10
− 3	− 7	− 8	− 5	− 2	− 8
9	4	4	5	9	2

Extra Practice — **Worksheet G4**, Pages 95-96

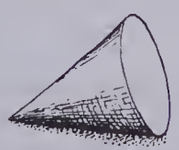
Print **can**, **cone**, or **cube**.



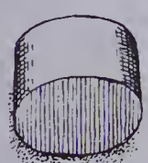
cube



can



cone



can



cone

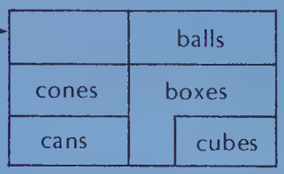


cube

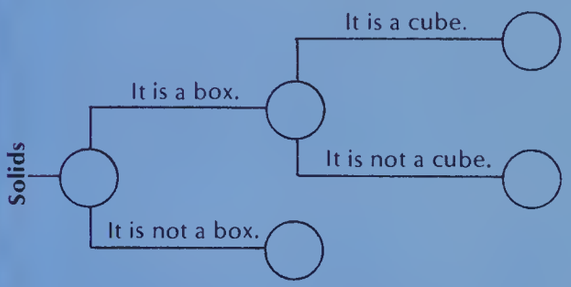
Reinforcement

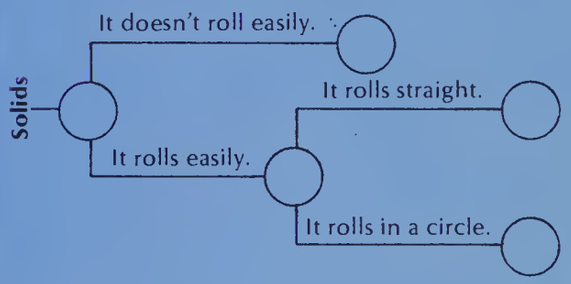
1. Provide about 4 boxes, 4 cubes, 4 cones, 4 cans, and 4 balls. Draw a *sorting shed* on cardboard.

Sorting Game
Sort the solids in the sorting shed.



2. Draw two *sorting tracks* on separate pieces of cardboard. The first is useful for sorting boxes and cubes; the second is for sorting solids according to how they roll. With both sorting tracks, the student places a solid at the beginning of the track (the left) and takes the branch that applies to the solid. (Sorting tracks are simple but versatile structures which can be helpful with all kinds and levels of sorting.)





Enrichment

Ask five students to write reports that summarize what was recorded on chart paper during the lesson about cones, cans, cubes, boxes, and balls. Use the reports as part of a geometry display for your public bulletin board.

UNIT 5 LESSON 5

Objective G5

Investigate the faces of common solids.

Vocabulary

Solids, face, flat, folding

Materials

2D and 3D objects
A collection of solids with matching paper faces
Sorting track for faces
Cardboard net for a cube

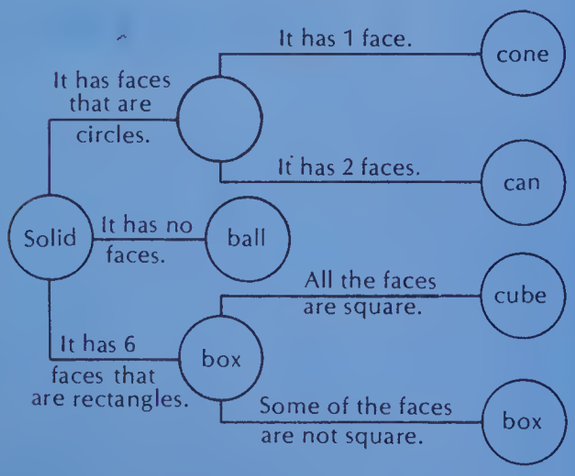
Introducing the Lesson

Ask the students to select solids from a collection of 2D and 3D objects. Have students explain how solids are different from the remaining objects: *The solids don't lie flat like the others. It's easier to pick up a solid.*

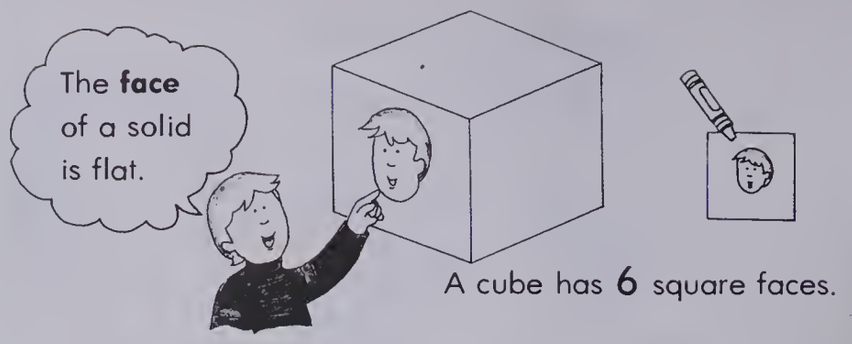
Explain that solids sometimes have outsides (surfaces) that are flat. These flat parts of solids are called **faces**. Draw a face on a paper overlay on a box's face to give this term a commonsense basis.

Teaching the Lesson

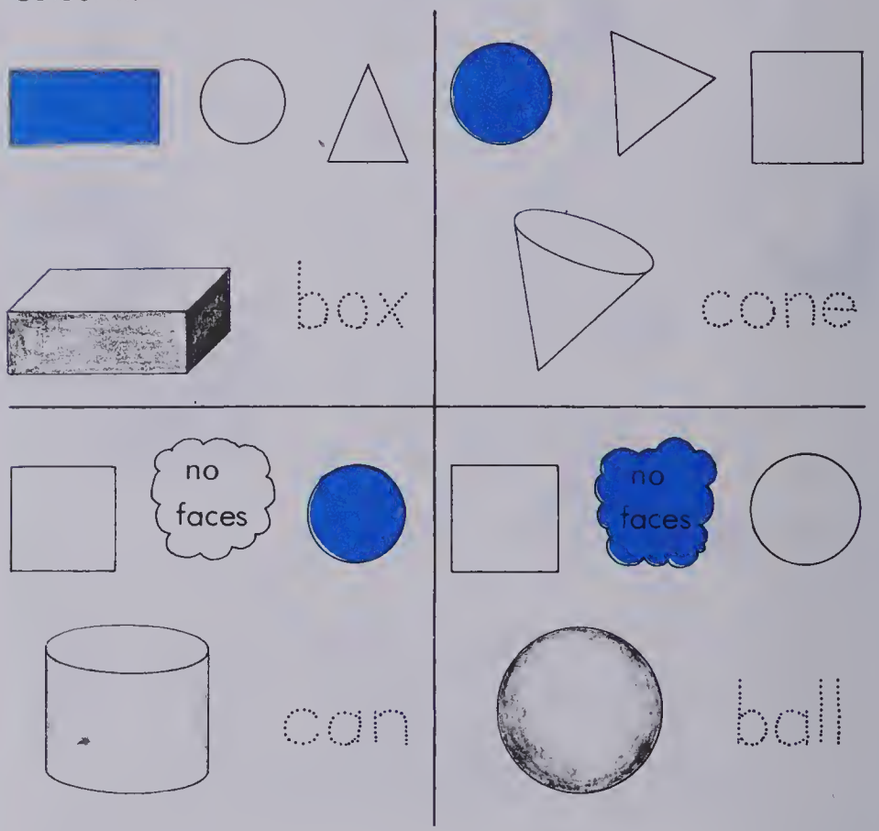
Use a sorting track drawn on cardboard to investigate the faces of the five solids (can, cone, box, cube, ball). Place a solid at the beginning of the track on the left and follow the branches that are appropriate.



When all the solids have been moved correctly along the sorting track, review the shape and number of faces for each solid. In particular, show how to count the 6 faces of a box so that each face is included exactly once.



Which looks like one of the solid's faces?
Colour it.



Faces

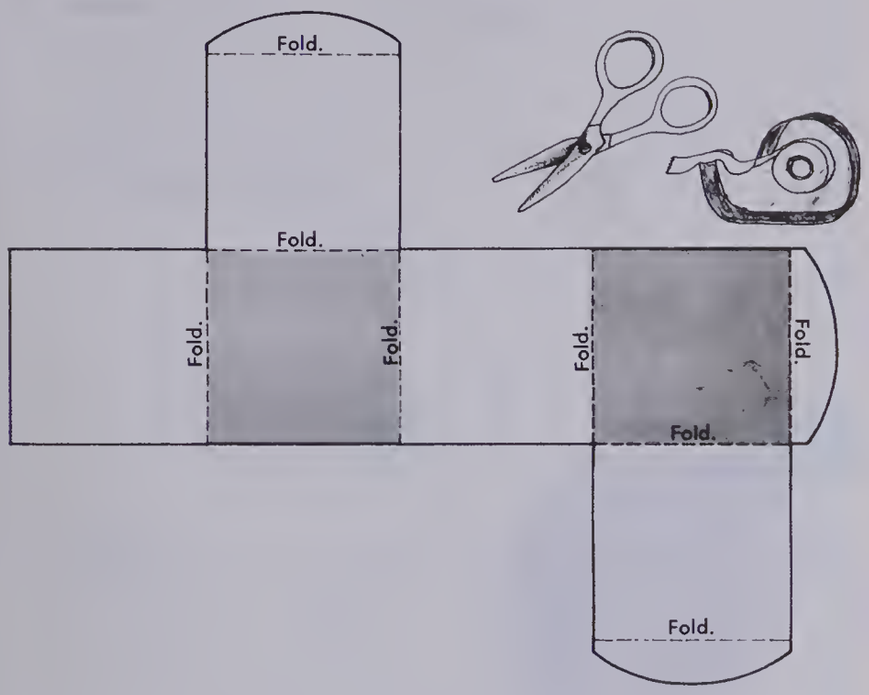
ninety-seven 97

Using the Pages

- Before assigning pages 97 and 98, it is recommended that the students pursue the activities described in the *Reinforcement* section. The workbook pages are most useful as a follow-up on the next day.
- Read together the directions on page 97. Explain how the boy counted 6 faces for the cube and then started to colour the square to show that the faces of a cube are square.
- Using a sample worksheet show the students how to cut out, fold, and tape the net (page 98) to form a cube.
- Remind the students to complete and have checked all the exercises and sentences on pages 97 and 98 before constructing the cube.
- *Looking Back* on page 98 reviews addition and subtraction to 12. Remind the students to note the signs carefully.

Cut out the figure. Fold it into a cube.

A cube has 6 square faces.



LOOKING BACK

Add or subtract.

5 + 6 = 11	10 − 4 = 6	3 + 7 = 10	11 − 8 = 3	4 + 8 = 12
12 − 9 = 3	11 − 4 = 7	8 + 2 = 10	6 + 6 = 12	7 + 5 = 12

Extra Practice **Worksheet G5**

Pages 97-98

Print the solid's name.



It has no faces. Ball



It has only one circle ● face. Cone



It has 6 square ■ faces. Cube



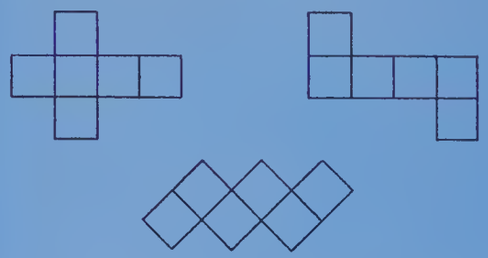
Some of its faces are rectangles. Box



It has two circle ● faces. Can

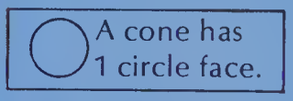
Reinforcement

1. Provide several nets which fold into cubes. Attach large cardboard or plastic squares hinged with tape or cloth in the configurations shown below. Let students experiment with the nets.



2. Allow students to experiment with the *sorting track* used in the lesson. Provide about 20 solids for this activity.

3. Organize five face-tracing stations. At each, place one of the solids (ball, can, cone, box, cube) and paper for drawing and recording. Require students to trace all the faces of each solid and summarize the results in a sentence. The papers may be stapled together to form a booklet.

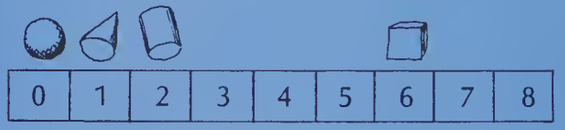


Enrichment

Challenge students to construct the five solids from clay or Plasticene. This activity may require considerable practice but it is an invaluable experience for many students. Several extensions are included below.

1. Set up a small sculpture gallery for the display of the solids.

2. Place the Plasticene solids along a number line. Challenge the students to devise solids to fill the gaps.



3. Use the faces of the Plasticene solids for print making. Students carve a design into a face using a variety of tools (scissors, pencil points, ruler ends). For the best results, approximately one half of the face should be carved away. Suggested motifs include: tree, bell, cradle, bauble, candle, and star.



UNIT 5 LESSON 6

Objective G6

Investigate the number of edges and corners of common solids.

Vocabulary

Solid, corner, edge, face
Line, curve, hole

Materials

A set of wooden or plastic solids
Plasticene and 5 modelling boards

Introducing the Lesson

Display and practise naming the 5 common solids: ball, box, can, cone, cube.

Flatten a large amount of Plasticene on the 5 modelling boards. Place the 4 solids with faces on the Plasticene "face down". Have students predict what will happen to the Plasticene when pressure is applied to the solids. Summarize this experiment together. *A face leaves its shape on the Plasticene.*

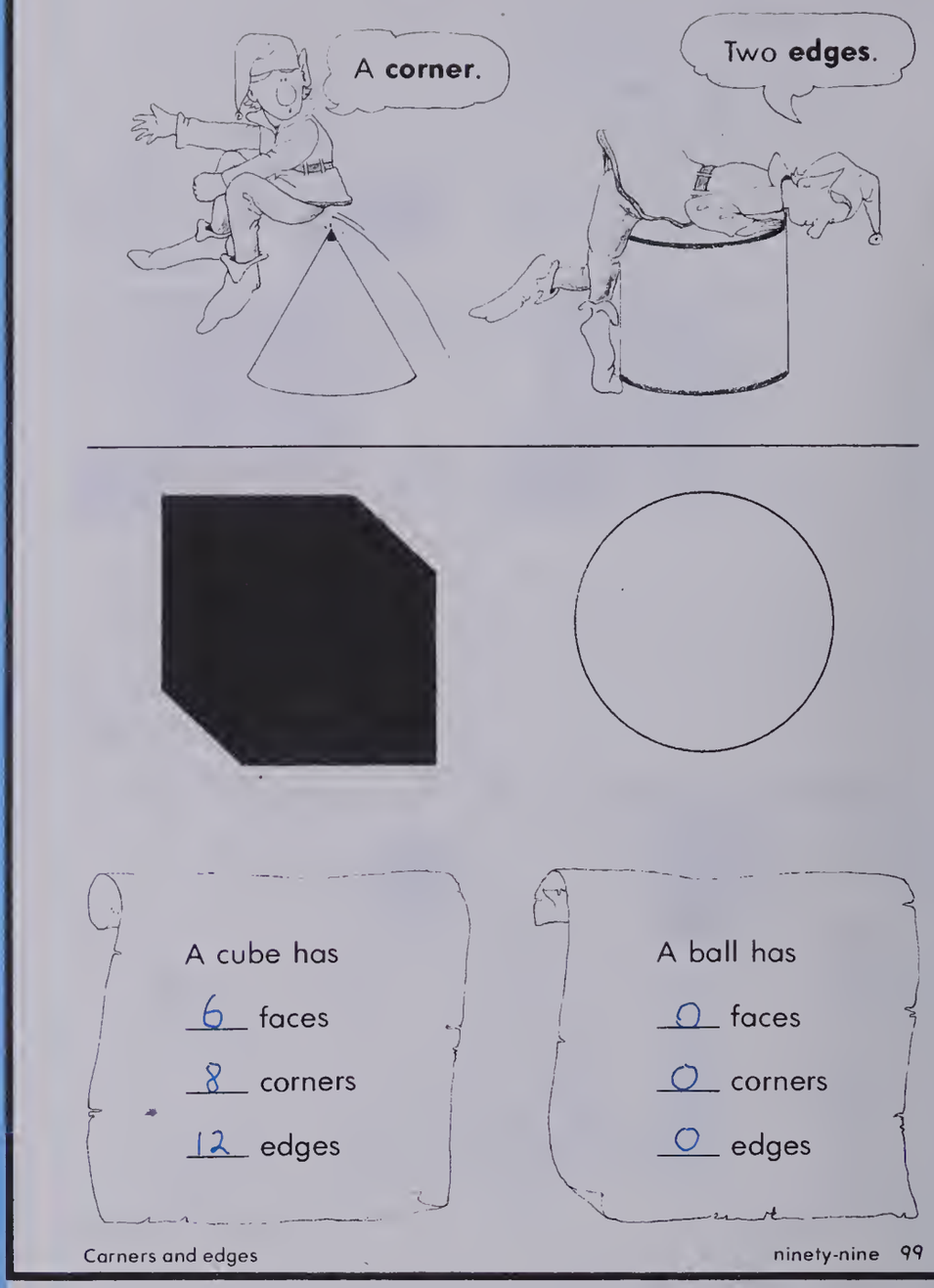
Point along the edges of several solids and ask for the name. Print "edge" on the board. Have students predict what will happen when only the edge is used to mark the Plasticene. Summarize this experiment together: *An edge leaves a line (or curve) on the Plasticene.*

Repeat a similar experiment after printing "corner" on the board.

Teaching the Lesson

Ask several students to try to count the number of faces, edges, and corners of a box. Since many students find this task difficult, have those who are successful explain what they did. One technique is *not* to pick up the solid while counting. A second method is to mark each part as it is counted. A third, the most difficult way, is to pick up the solid and try to remember which parts have been counted. Record the results on the board.

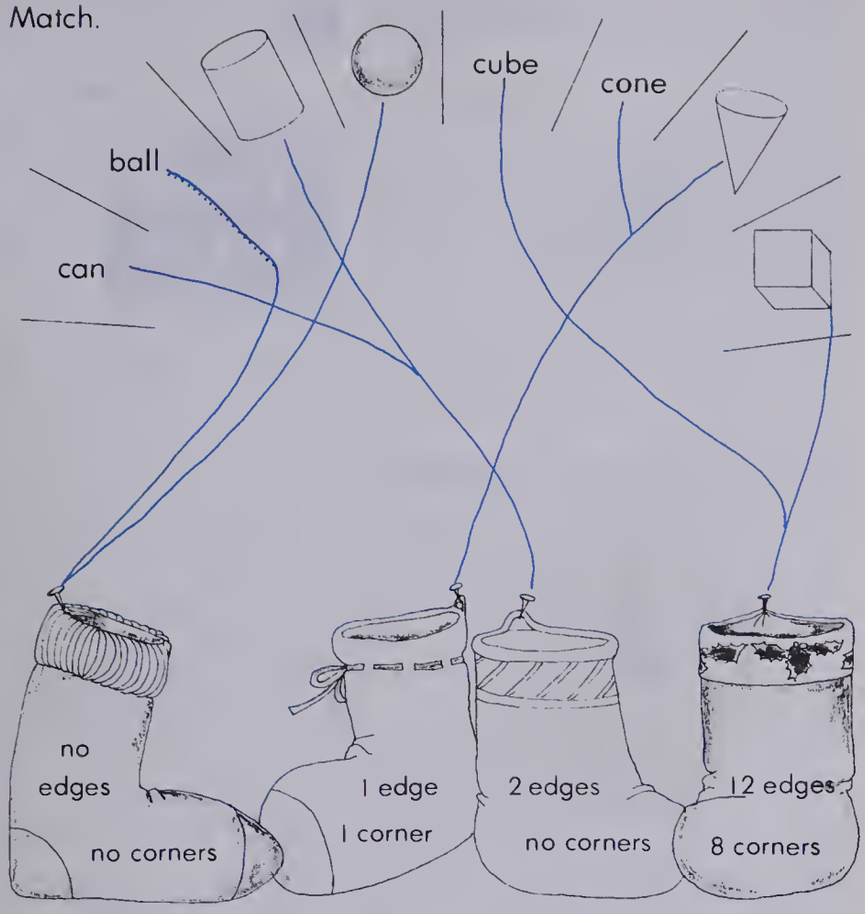
Repeat the same procedure for the other solids.



Using the Pages

- Provide enough solids so that students may refer to them while completing pages 99 and 100.
- *Looking Back* provides practice in numeration to 100. As an extra challenge (and a preview to the next unit), the last two octagons require students to print 104 and 105. This should not present a difficulty since the pattern is established with 101, 102, 103. After completing the exercise, ask the students to count aloud from 76 and name the numerals over 100. Review Lesson N11 (pages 53-54), if necessary.

Match.



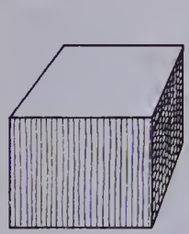
LOOKING BACK

76	77	78	79	80	81	82	83	84	85
86	87	88	89	90	91	92	93	94	95
96	97	98	99	100	101	102	103	104	105

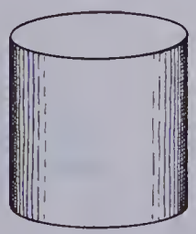
Extra Practice

Worksheet G6
Pages 99-100

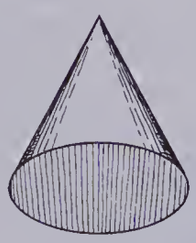
Print the number.



6 faces
8 corners
12 edges



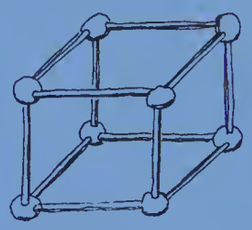
2 faces
0 corners
2 edges



1 faces
1 corners
1 edges

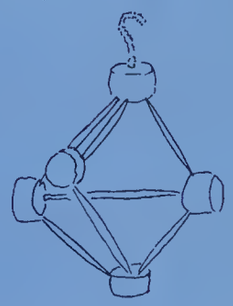
Reinforcement

Ask students to build a **skeleton** of a cube using straws and Plasticene. Have them record the number of straws and balls of Plasticene needed for one cube. Compare these numbers to the previously found number of edges and corners for a cube.

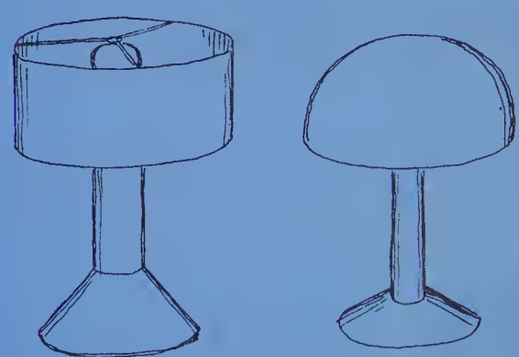


Enrichment

1. Provide small marshmallows and coloured toothpicks. Allow the students to construct skeleton models with them. These can be eaten during the holidays.



2. Play *Hidden Solids*. Many common objects have an underlying form that consists of a combination of the five solids investigated in this unit. Many lamps, for instance combine these shapes: a short cone, a thin can, and a large can or half ball. Challenge your students' imagination by investigating objects in the room for their underlying forms.



UNIT 5 LESSON 7

Objective G7

Explore tiling and area using congruent figures.

Vocabulary

Cover, fit together, overlap, gaps
Guess and test

Materials

Drawing paper, checkers, playing cards
Approximately 50 copies of the parallelogram, pentagon, hexagon, and fish on page 101
Approximately 100 two-centimetre squares

Introducing the Lesson

Begin to place pieces of drawing paper on the floor as if to cover it completely. Neither overlap the sheets nor leave **gaps**. Ask the students if it would be possible to cover the floor if you had enough sheets of paper. Discuss why this would be so using the terms *cover*, *overlap*, and *gaps*.

Repeat the same procedure with checkers on a flat surface. Determine that it is not possible to cover the surface, since gaps occur unless the checkers are overlapped.

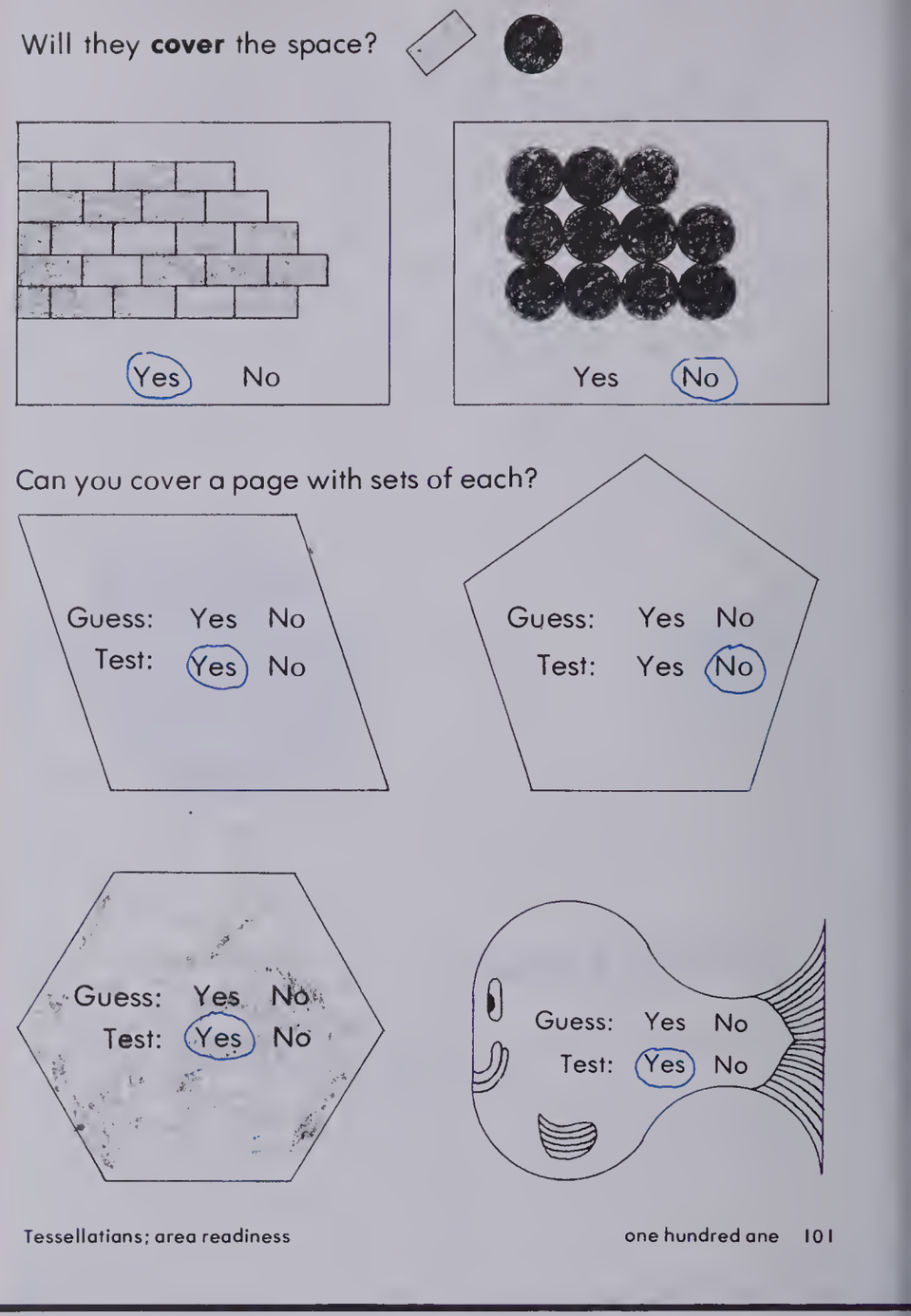
Teaching the Lesson

Discuss why the idea of covering is useful. Use floor and ceiling tiles as practical examples.

Explain that people sometimes need to measure flat regions just as they need to measure lengths. For example, to measure the top of a desk, a person might cover it by using a unit object such as a piece of drawing paper or a playing card. Have everyone guess the number of sheets of paper and number of playing cards that would be needed to cover the desk top. After recording the guesses of several students, proceed to cover the top to test the guesses.

Mike Johnson

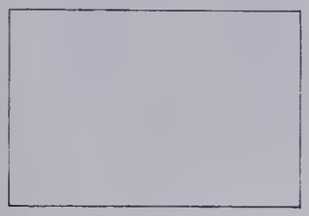
Guess:	*Test:*
6 sheets of paper 70 playing cards	8 sheets of paper 96 playing cards



Using the Pages

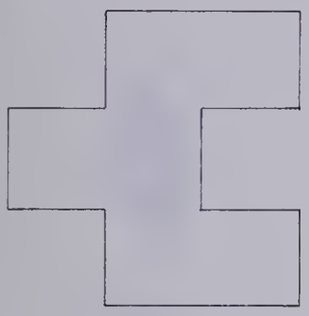
- Pages 101 and 102 are essentially recording sheets for activity stations involving tiling (covering) a surface. The students must guess whether sets of each shape would cover a sheet of paper (page 101) and how many squares are needed to cover several small figures (page 102). Encourage students to think before making each guess. This behaviour should be modelled carefully in the demonstration above.
- For the testing portion of the lesson, you will need to set up stations for each of the four figures: parallelogram, pentagon, hexagon, fish, and square (page 102). About 100 squares and 50 each of the other figures are needed to accommodate a small class. You may want students to show you a sample of the covering before moving on to the next station.
- Provide centimetre cubes for this worksheet.

How many ☐ will it take to cover each?



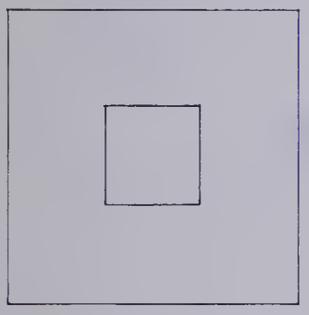
Guess: ____ squares

Test: 6 squares



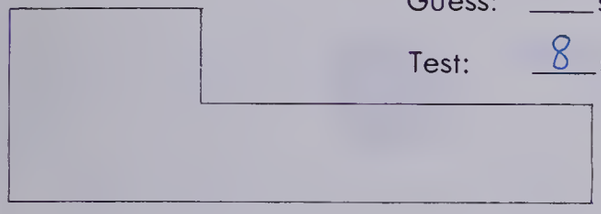
Guess: ____ squares

Test: 6 squares



Guess: ____ squares

Test: 8 squares



Guess: ____ squares

Test: 8 squares

Extra Practice

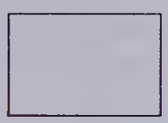
Worksheet G7
Pages 101-102

How many ■'s will it take to cover each?



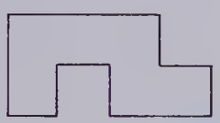
Guess: ____ ■s

Test: 4 ■s



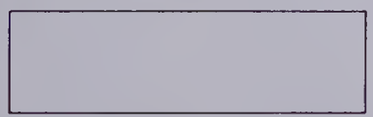
Guess: ____ ■s

Test: 6 ■s



Guess: ____ ■s

Test: 6 ■s



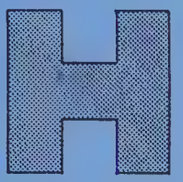
Guess: ____ ■s

Test: 16 ■s

Reinforcement

1. Set up an activity centre for further exploration of coverings. Suggested materials include: checkers, playing cards, dominoes, pattern blocks, and attribute blocks.

2. Construct a set of area workcards using the format shown. Students guess the number of cube faces needed to cover the 2D figures. They then test their answer using actual cubes.

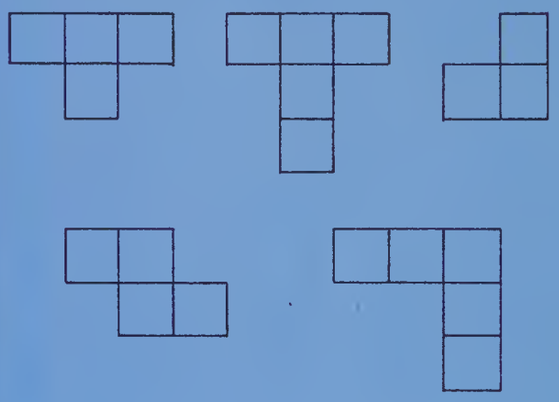


Guess: ____ ■s

Test: ____ ■s

Enrichment

Provide 20 large cardboard models of each figure below. Challenge students to discover which figures will cover a sheet of paper.



UNIT 5 LESSON 8

Objective G8

Recognize similar shapes and sort figures by colour and by number of sides.

Vocabulary

Same shape
Sides, number of sides
Sort, *and*

Materials

Magnifying glass, overhead projector
Sets of similar, white, 5-pointed stars and 6-pointed stars
A collection of 8 coloured figures (4-sided green, 4-sided blue, 4-sided red, 5-sided green, 5-sided blue, 5-sided red, 6-sided red, 6-sided green)
Scissors, tape or paste

Introducing the Lesson

Hold up a small square for everyone to see. Then use either a magnifying glass or an overhead projector to enlarge the square. Determine through discussion that the new figure still has a square shape, but is larger. Say "They have the same shape. They're both squares." Repeat using a 5-pointed star.

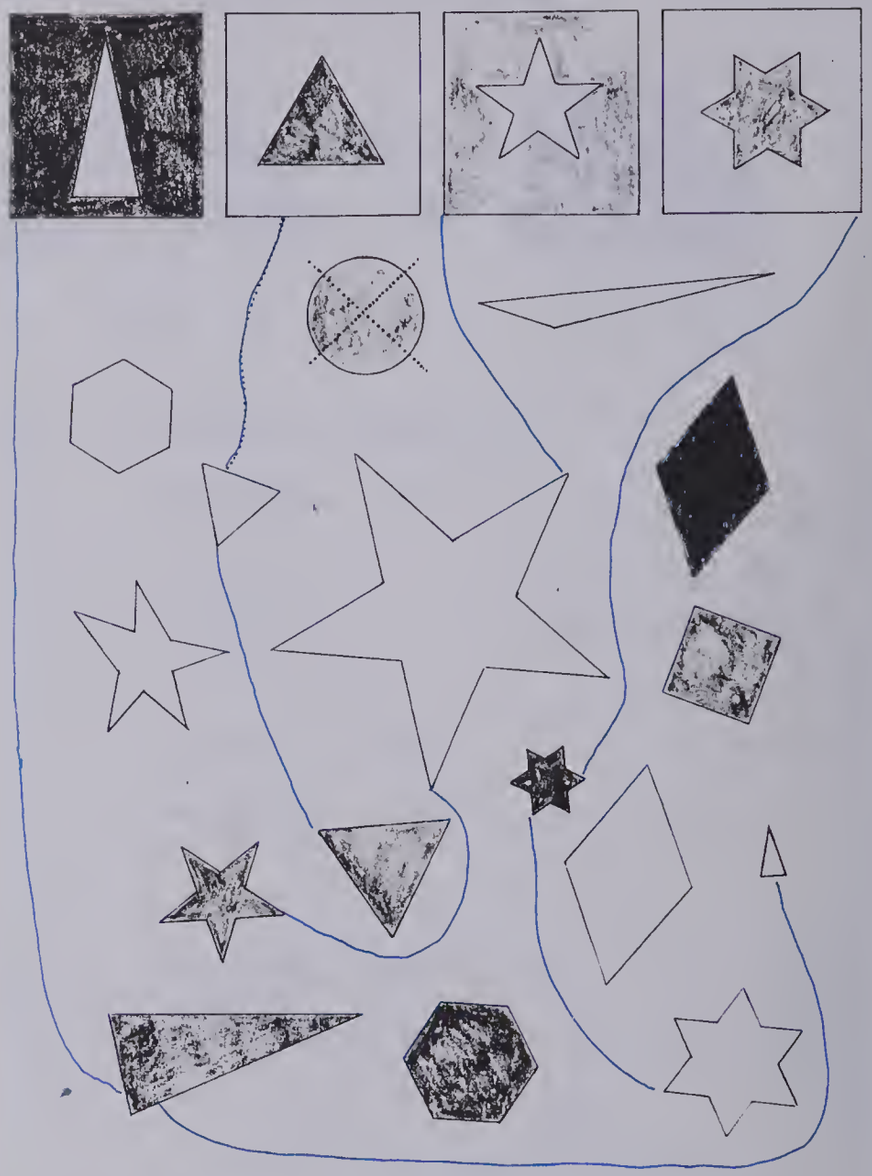
Mix together the sets of 5-pointed and 6-pointed stars. Pull out a 5-pointed star and a 6-pointed star. Ask if they have the same shape. Carefully show that one has 5 points and the other has 6 points. Have someone count the 10 sides of the 5-pointed star and the 12 sides of the 6-pointed star. Conclude: "The stars can't have the same shape."

Summarize: Figures that have a different number of sides have different shapes.

Teaching the Lesson

Print on the board "5 sides and not blue". One by one, hold up the coloured figures and discuss whether they have the properties described on the board. Stress the importance of the word *and*; that is, both properties must exist. For example, the 5-sided blue figure doesn't qualify since it is blue and no blue figures are permitted. The 4-sided green figure doesn't qualify since it doesn't have 5 sides.

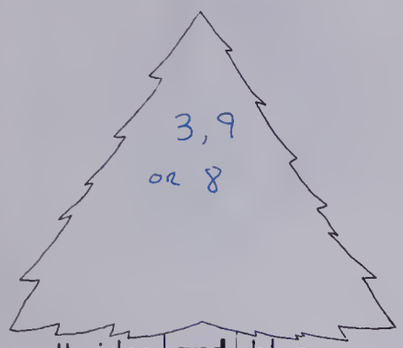
Find 2 more figures with the same shape.



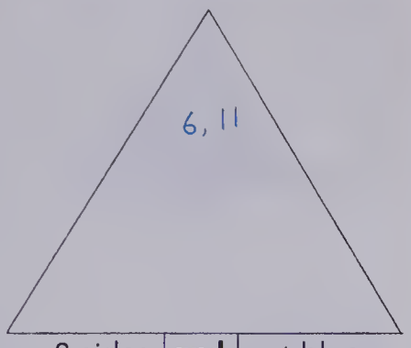
Using the Pages

- Pages 103 and 104 may be assigned at separate times. Page 103 must be checked before page 104 is begun since the bottom section of page 104 needs to be cut apart by the students.
- For page 104, please note that only 8 of the 14 baubles will be taped or pasted onto the worksheet (exactly 2 per tree).

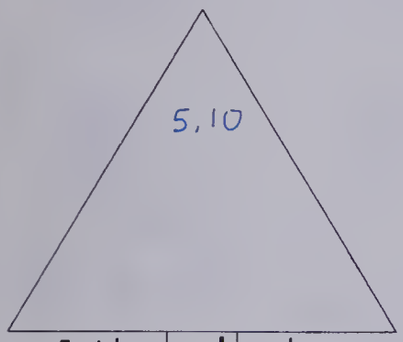
Paste two □ on each △.



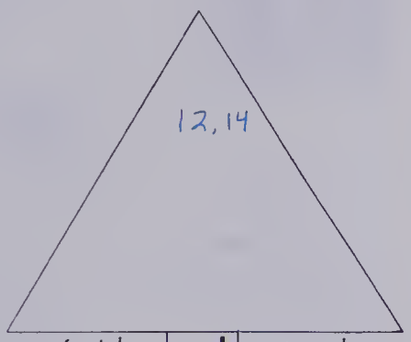
4 sides **and** blue



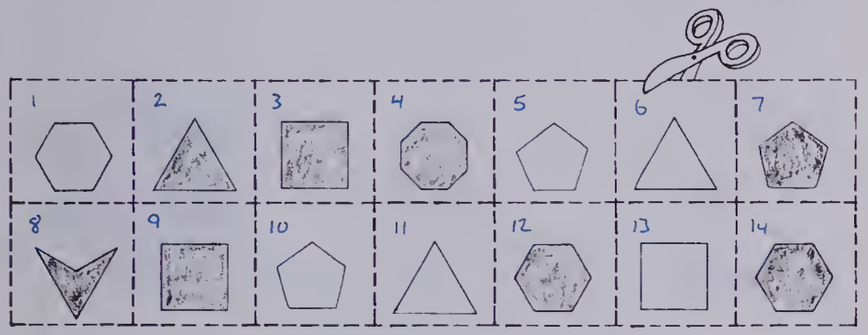
3 sides **and** not blue



5 sides **and** red



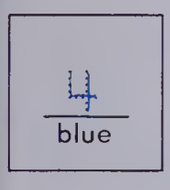
6 sides **and** not red

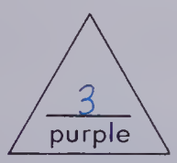


Extra Practice **Worksheet G8**

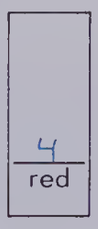
Pages 103-104

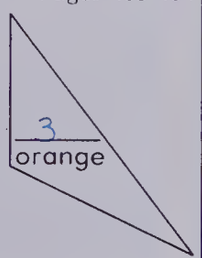
Count the sides.

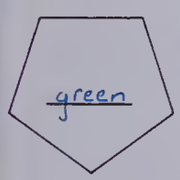


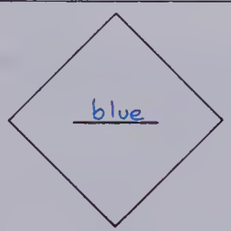


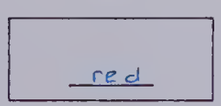


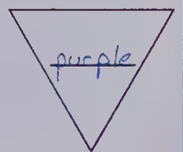


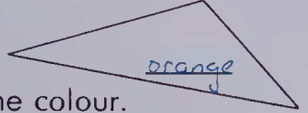








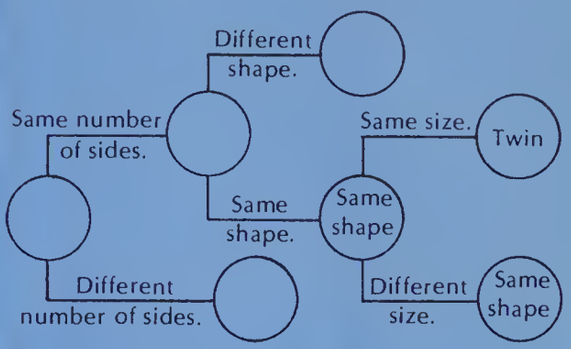




Colour the same shapes the same colour.

Reinforcement

Compare the workbook's use of **twin** (congruent, Lesson 1) and **same shape** (similar, Lesson 8). Provide pairs of congruent and similar figures for use with the following sorting track.

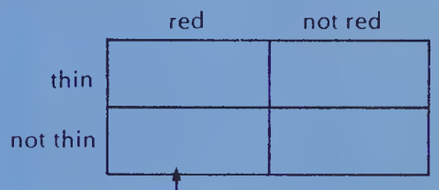


Enrichment

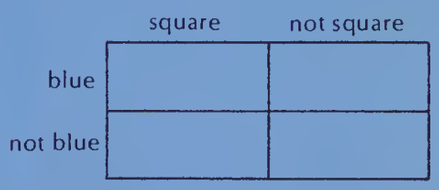
1. Challenge students to make four 2D baubles with different numbers of sides: 3, 4, 5, and 6. Provide tin foil, glitter, pipe cleaners, stars, stickers,...

2. Ask students to draw 4 pairs of figures (3-sided, 4-sided, 5-sided, and 6-sided) to prove that the following statement is false. "Figures with the same number of sides have the same shape."

3. Obtain a set of *attribute blocks*. Introduce the *Carroll sorting diagram*. Provide a collection of attribute name cards on which to print each attribute and non-attribute. (red and not red) Here are several examples.



All things *red* **and** *not thin* can be placed here.



UNIT 5 LESSON 9

Objective G9

Identify symmetric figures and lines of symmetry.

Vocabulary

Symmetry, match, fold, lines of symmetry, fold line

Materials

Paper figures with and without symmetry

Rulers, scissors

MIRA

Introducing the Lesson

Using the paper figures, challenge students to demonstrate how each figure can be folded into two parts to match exactly.



Explain that figures that can be folded so that the parts match are called **symmetric**. The fold line is also called the **line of symmetry**. Print "symmetry" on the board. Read "symmetry" by syllables.

Teaching the Lesson

Show figures which are not symmetric,



figures that have several lines of symmetry,



and asymmetric figures whose two parts match if cut and slid but don't match if folded.

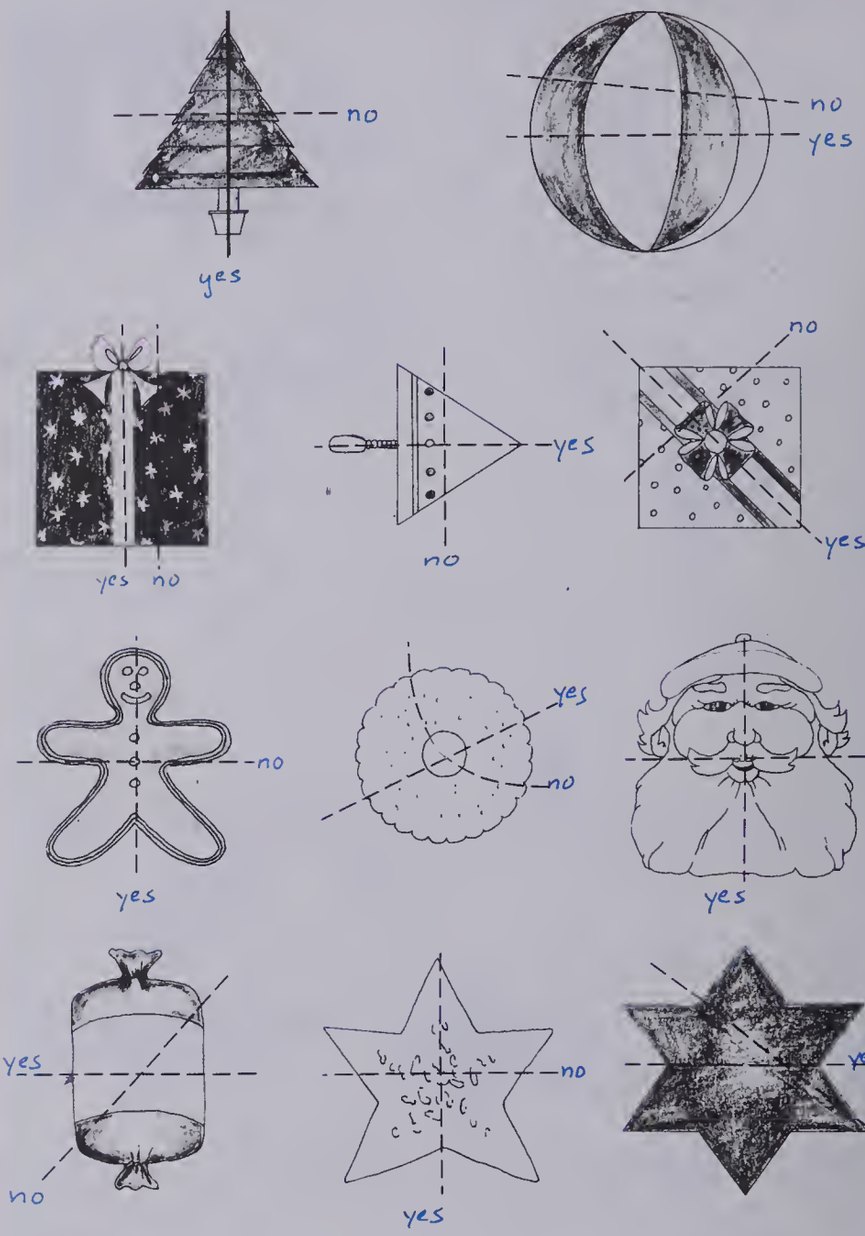


versus



Use scissors and tape to illustrate these figures.

Which line cuts the figure into matching parts?



Using the Pages

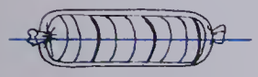
- Provide students with an opportunity to manipulate and explore the paper figures used for instruction before assigning the workbook.
- On page 105, students are to trace over the line of symmetry with a crayon.
- For page 106, students use rulers to draw lines of symmetry. For the figures which are not symmetric, a "no" is to be printed as shown in the example.
- *Looking Back* provides a review of number comparison for numbers up to 100. Review Objective N13 (pages 59-60), if students have difficulty with this exercise.

Find and cut the symmetric figures.

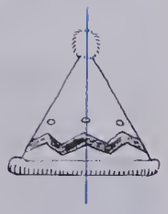
symmetric not symmetric







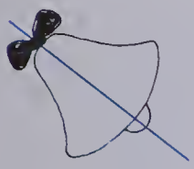




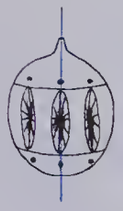












LOOKING BACK

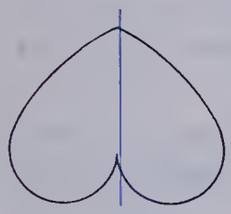
Circle the greater number.

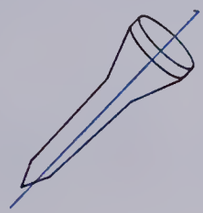
(80) or 70	35 or (37)	79 or (97)
93 or (100)	(80) or 72	35 or (53)

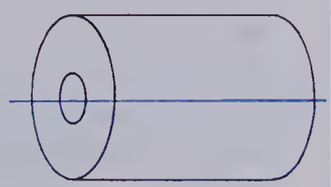
Extra Practice **Worksheet G9**

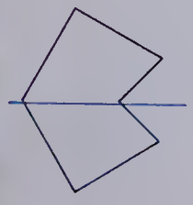
Pages 105-106

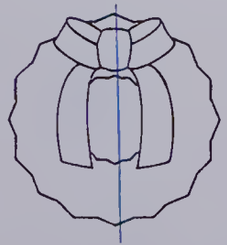
Draw a line of symmetry.

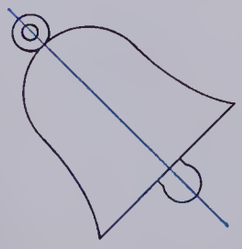












Reinforcement

Several excellent commercial kits are available for the exploration of pattern, design, and symmetry by primary students.

Pattern blocks provide invaluable creative experiences. The colourful blocks in each set are easily combined into complex designs having one or more lines of symmetry.



Mirror Cards is a collection of workcards that are easy to use. The materials are carefully sequenced and lead students gently into rather complex problem-solving explorations.

MIRAMATH consists of a *MIRA* (a clever adaptation of a mirror which shows the image on its flip side) and suggestions for activities.

Enrichment

As a crafts activity have students make symmetric baubles.

1. Cut a symmetric figure from colourful construction paper and tin foil. Students fold paper and foil together. Then they cut out a figure such as a bell, triangle, star, or tree. (You may want them first to experiment with pieces of inexpensive newsprint.)

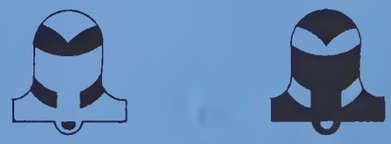
2. The folded foil piece is removed and cut into smaller symmetric shapes.

3. Carefully unfold the foil pieces and construction paper.

4. Glue the foil onto both sides of the paper so that symmetry in design is preserved.

5. Decorate further using glitter, stars, crayons, etc.

FRONT BACK



UNIT 5 LESSON 10

Objective G10

Draw symmetric figures.

Vocabulary

Symmetry, line of symmetry, draw, grid

Materials

Tape, scissors, construction paper (2 colours)
Construction paper (gridded), mirrors or *MIRA*s

Introducing the Lesson

Hold up a construction paper figure which is not symmetric and has one straight side. Ask, "How can we add another figure to this one to make a symmetric shape?" After discussion, trace and cut out a copy of the figure from a different colour of construction paper. Then tape the figures along what becomes the "fold line" for the symmetric figure.



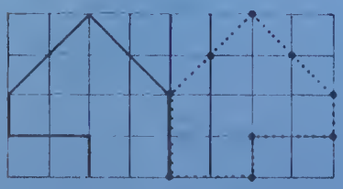
Tape two colours of construction paper together. Draw and cut out half of a symmetric figure as shown below. Ask, "How can we cut out the rest of this figure so that it is symmetric?" From suggestions, fold the figure along the proposed line of symmetry. Cut out the symmetric figure.



fold and cut unfold

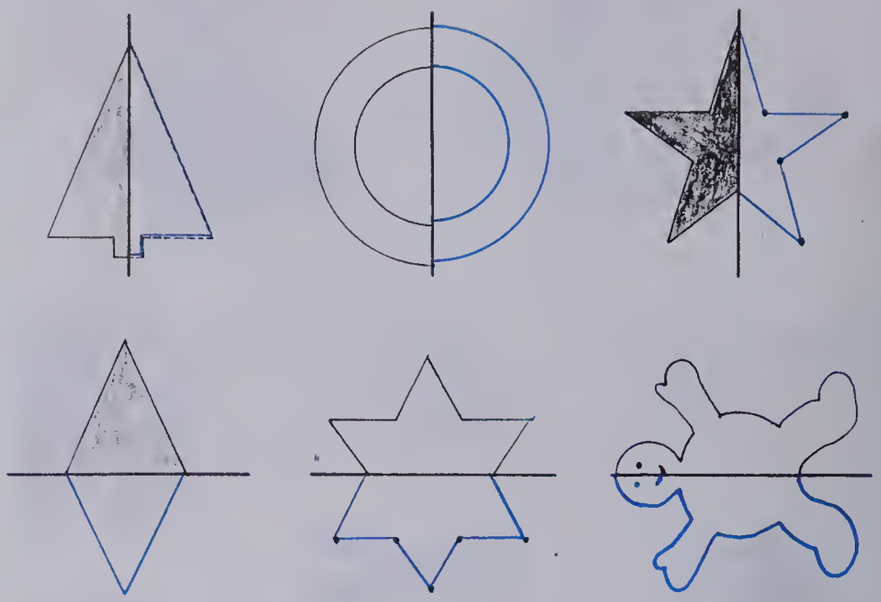
Teaching the Lesson

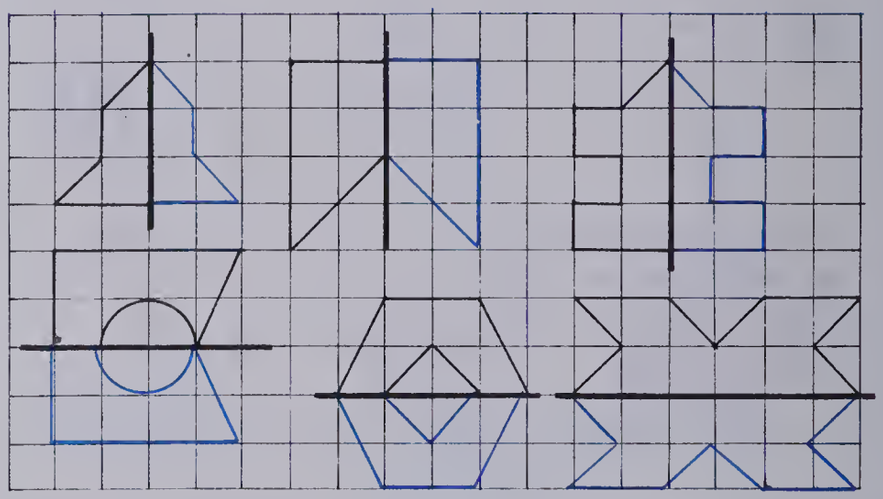
Show a figure drawn on gridded construction paper. Discuss how to use the grid to complete the symmetric figure. Carefully demonstrate how to count the number of squares from the fold line to the edge of the figure. Place dots and then connect them.



2 away
1 away and 3 away
0 away and 4 away
2 away and 4 away
0 away and 2 away

Draw the matching part.



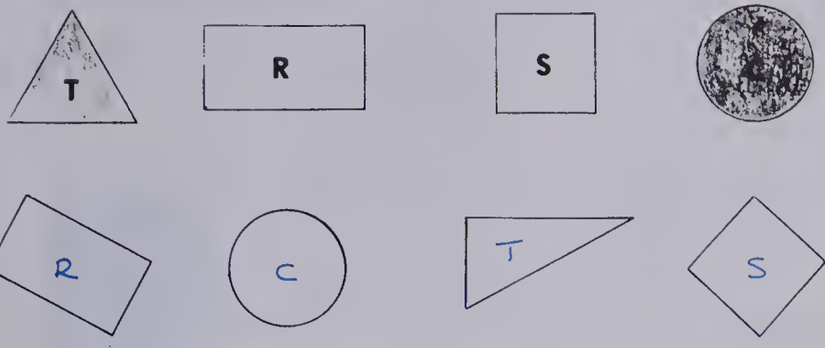


Symmetry one hundred seven 107

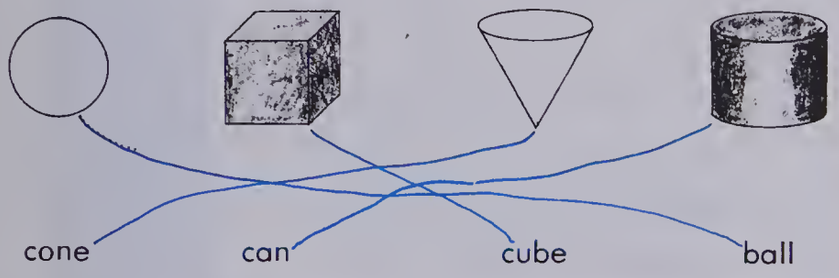
Using the Pages

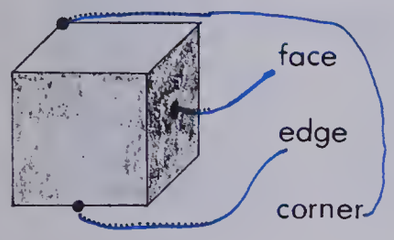
- The exercises on Page 107 should be viewed as enrichment topics. Some students will understand the processes and skills that are required, but may be unable to make the figures look symmetric. Emphasis should be on their enjoyment of the drawing activity.
- To assist students, provide *MIRA*s or small mirrors. These are placed along the line of symmetry to get an image of the missing part.

Print the letter on the same kind.



Match these.

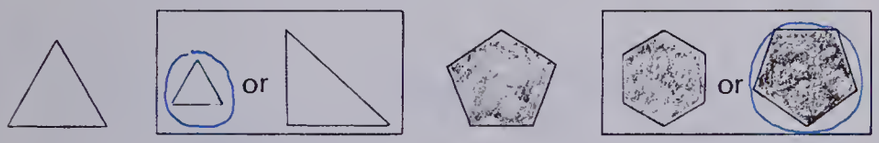




Cut each into matching parts.



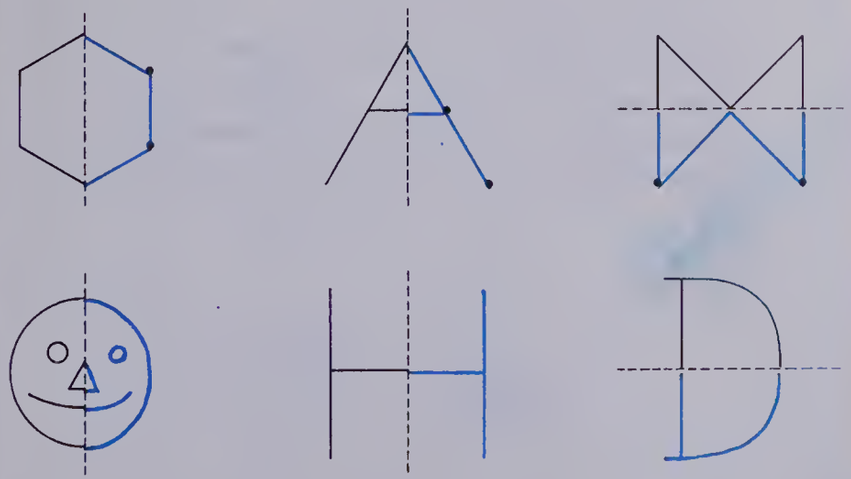
Circle the same shape.



Extra Practice **Worksheet G10**

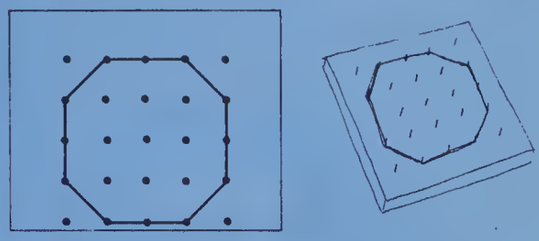
Page 107

Draw the matching part.

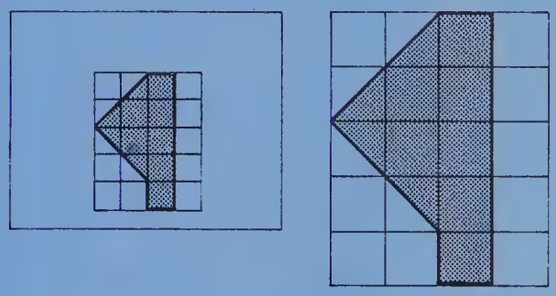


Enrichment

1. Prepare a set of simple workcards for use with geoboards that involve copying figures.



2. Prepare a set of workcards that involve enlarging figures onto large grid paper.



3. Provide blank workcards designed for use with geoboards or large grid paper. Allow students to create their own designs for other students.

UNIT 5 TEST

Part 1: Identify matching 2D figures.

Part 2: Identify matching 3D solids.

Part 3: Recognize a face, edge, and corner of a solid.

Part 4: Draw a line of symmetry.

Part 5: Recognize similar figures.

UNIT 6
Numerals to 999

Theme: Fantastic Creatures

Lesson		Objectives	Pages
1	N18	Count by hundreds to 900.	109-110
2	N19	Identify and write numerals to 999.	111-112
3	N20	Compare numerals to 999.	113-114
4	N21	Count to 999.	115-116
5	N22	Count by 10s to 999.	117-118
6	N23	Count by 5s to 999.	119-120
7	M3	Determine the value of sets of nickels and sets of quarters.	121-122
8	PS5	Solve simple word problems involving money to 99¢.	123-124
9	M4	Recognize and write amounts to $9.99 involving dollars, dimes, and pennies.	125-126
10	PS6	Locate amounts on a table and compare amounts to $9.99.	127
Test		Numerals to 999	128

Vocabulary

hundred
ten
table form
standard form
hundreds place
compare
greater
less
smaller
pattern
nickel
5 cents
quarter
25 cents
price
lost
found
dollar bill
$.
dollars and cents
to $9.99
dollars
cents

Printed Directions:

Count by 100s.
Which is greater?
Colour the monster with the smaller number.
Count by 1s.
Count by 10s.
Count by 5s.
Match these.
Match the amounts.
Count with 1¢s.
Which is less?
How much?
What is the number?
Keep counting.

Materials

place-value grids or tables

h	t	o

place-value materials

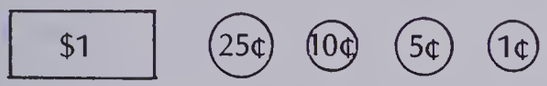
"place-value pig" (See the pattern in this Introduction.)

base ten blocks: hundreds, tens, ones



vertical counting ladders (See the pattern in this Introduction.)

currency facsimiles



counting by 10s cards



counting by 5s cards



felt markers
metre sticks
crayons
tape
scissors
dot-to-dot puzzles
long rolls of paper, such as cash register tapes
five toys with price tags

Monster Table (Poster):

Monster	Fred	Greg
		
How many teeth?	435	290

Wolf	Shark
	
184	362

About This Unit

This unit includes activities and exercises involving place value, comparing, and counting by 1s, 10s, and 5s. Nickels and quarters are introduced. Amounts above $1.00 are formed using dollar bills, dimes, and pennies.

Numeration is a fundamental topic in any elementary math program. Misconceptions and confusion regarding numeration can severely hamper a student's ability to compute and estimate. The goal of this unit is to provide a systematic and experiential approach relating manipulative materials and numeration symbols.

Developing number and numeration concepts, processes, and skills takes time and patience. A minimum of twenty to twenty-five periods may be required to establish the objectives of Unit 6. It is critical that no arbitrary or rigid time line be adopted. Teachers must continually make decisions regarding pacing and depth of treatment which satisfy the needs of individual students. Sufficient reinforcement and enrichment suggestions are available in the lesson notes to assist the teacher in planning a wide range of experiences.

Unit 6 is designed to appeal to the student's intuitive sense of and delight in pattern. The treatment of place value, counting, and comparing contributes to the notion of mathematics as the study of patterns. Place value concepts, particularly manifested in concrete form and standard form, are found throughout Unit 6. Comparison activities in Lessons 3, 7, 9, and 10 focus on the distinctions between the hundreds digit, tens digit, and ones digit.

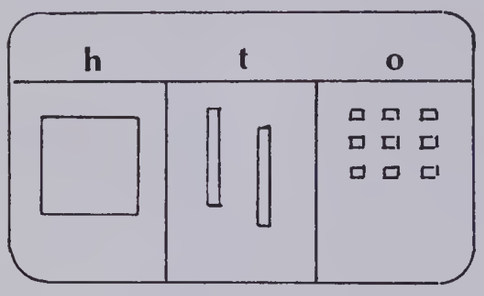
421 is greater than 193



$4.21 is greater than $1.93

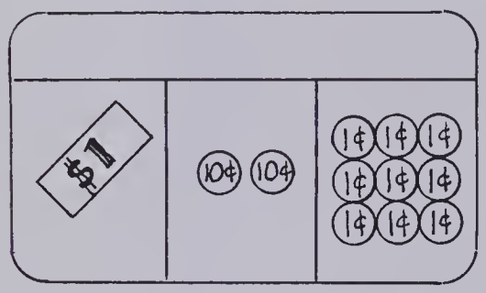


Counting activities utilizing concrete materials in Lessons 1, 4, 5, 6, and 9 establish number patterns, particularly the relationship between the ones and tens place, and between the tens and hundreds place.



h	t	o
1	2	8
1	2	9

"Trade 10 ones for 1 ten."



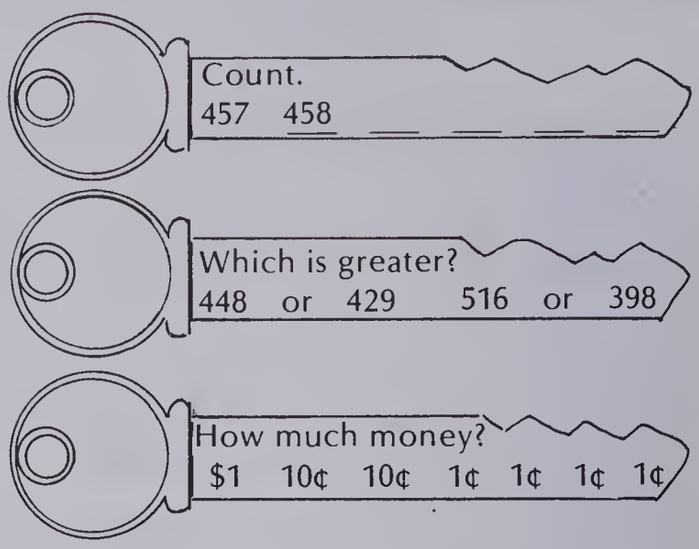
$1	10¢	1¢
$1.28		
$1.29		
$1.		
$1.		

"Trade 10 pennies for 1 dime."

Ideas

The unifying decorative theme for Unit 6 is *Fantasy Creatures.* Elves, fairies, and cute monsters frolic on many of the workbook pages. Students enjoy watching and discussing this cast of characters parade past. The integrative theme of fantasy creatures may be extended into language arts (fairy tales and fantasies, creative writing, and drama), into art and music (interpreting and creating works of fantasy), into social studies (make-believe and reality), and into physical education by improvising the movement of imaginary creatures.

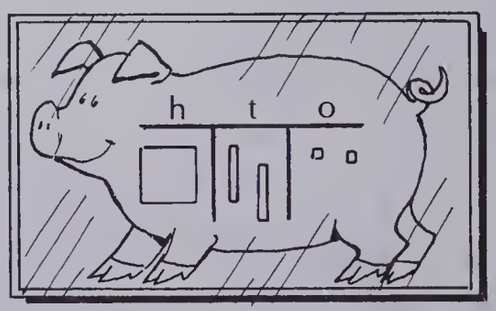
The concepts and skills developed in Unit 6 may be forgotten quickly unless review occurs after the unit has been covered. The time devoted to review need not be extensive, but it should be frequent. Students are easily motivated to do well on a review if it is made special in some way, for example, if it earns some reward or privilege for the class. One good idea is to have the class (as a group) earn a "leave-taking key" for recess, lunch, or after school. Display the key for all to see. Make certain that all the students have an opportunity to complete the key orally.

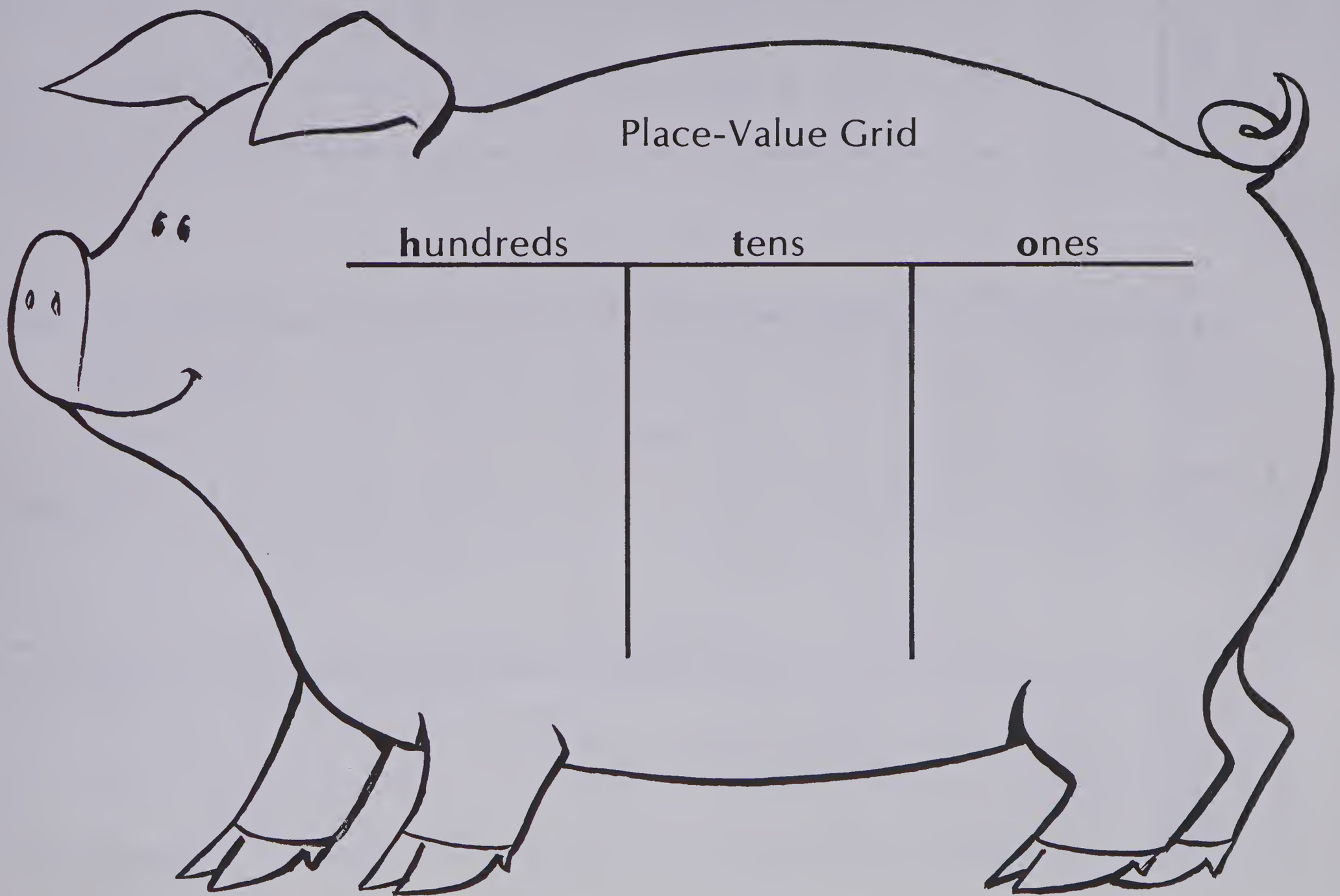


Constructing a hallway number line to 1000 is an active and memorable class project. The versatility of the hallway number line is discussed further in the Reinforcement and Enrichment sections of Lessons 3 to 6, particularly Lesson 4.

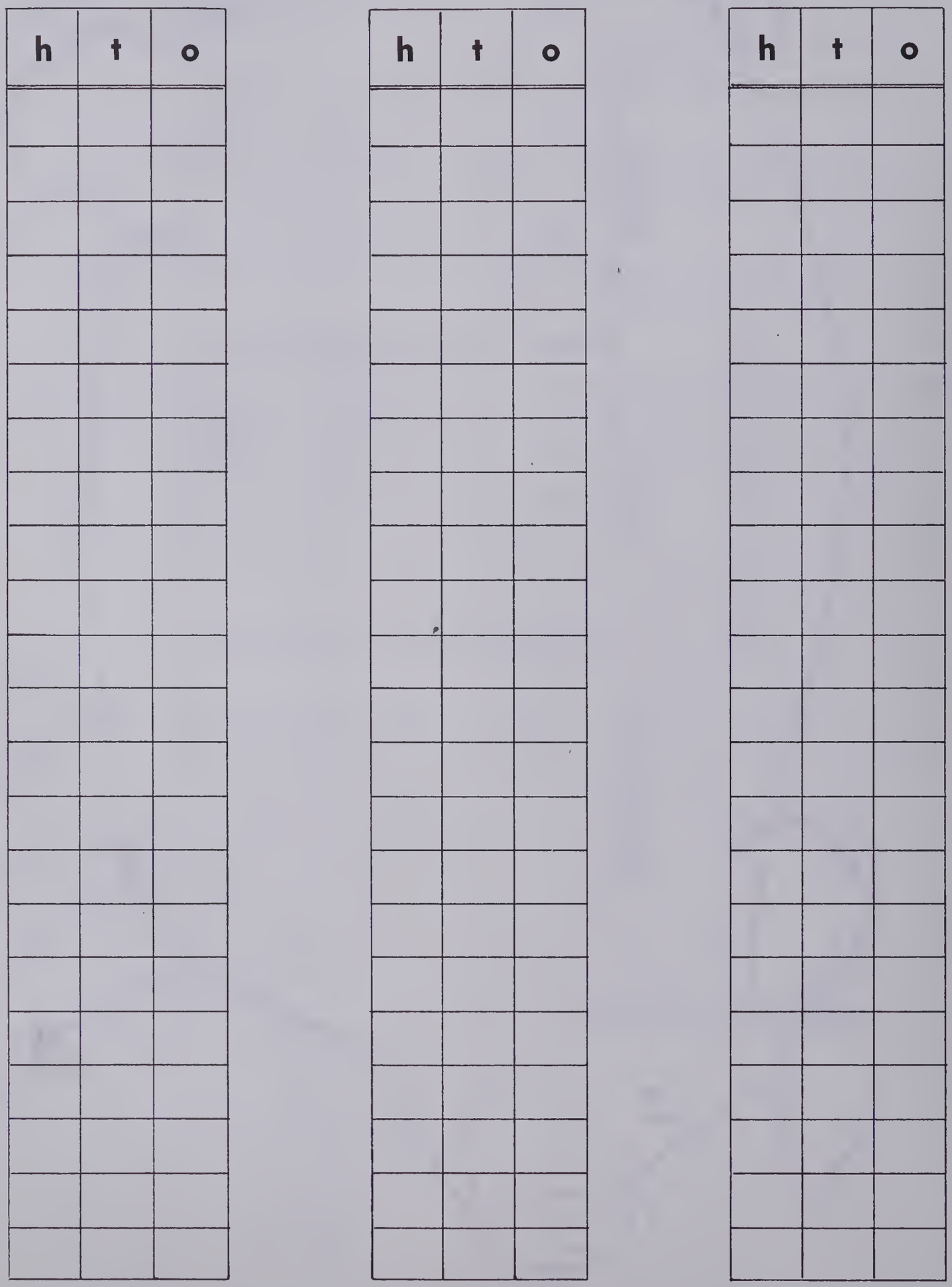
466 467 468 469 470 471 472

The "place-value pig" (a grid), found in the Introduction to this unit, may be duplicated on coloured construction paper and covered with clear plastic. This grid is useful for any manipulative work involving place value: writing numerals, counting, comparing, or working with amounts to $9.99. The grid helps the students to manipulate number blocks, money, and other place-value materials.

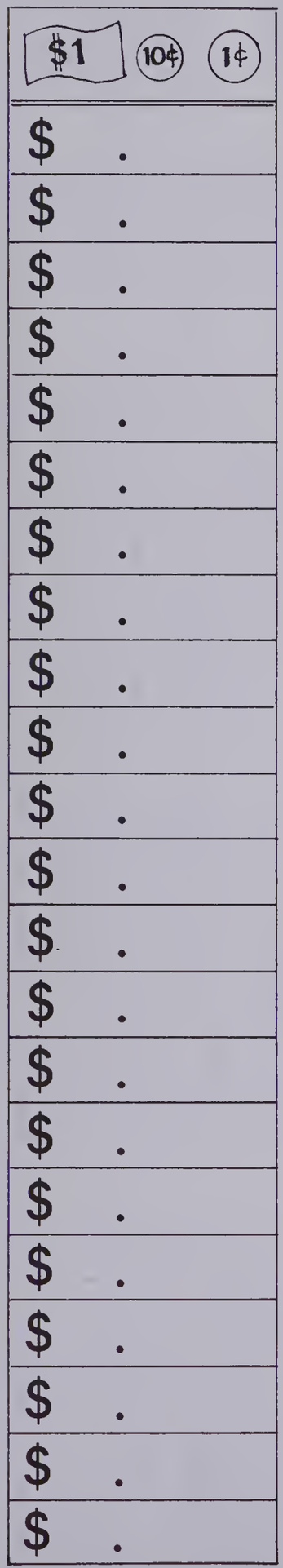


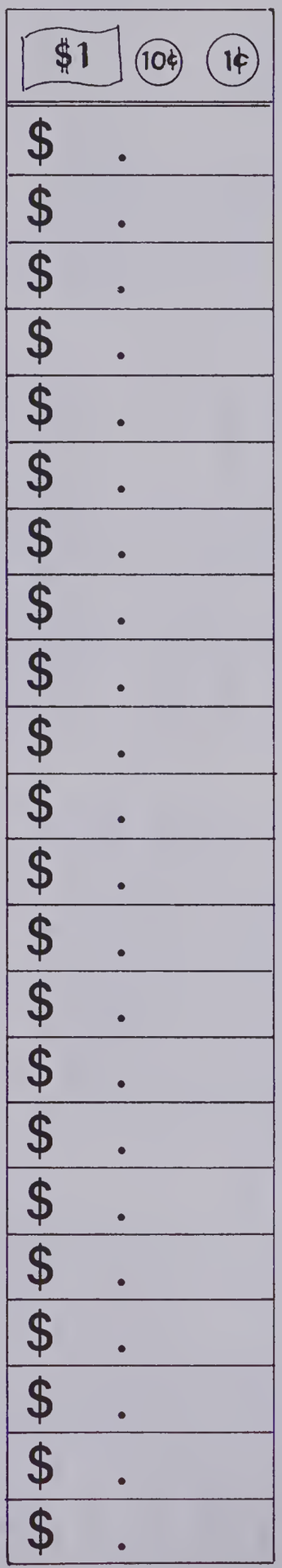

Place-Value Grid
hundreds
tens
ones

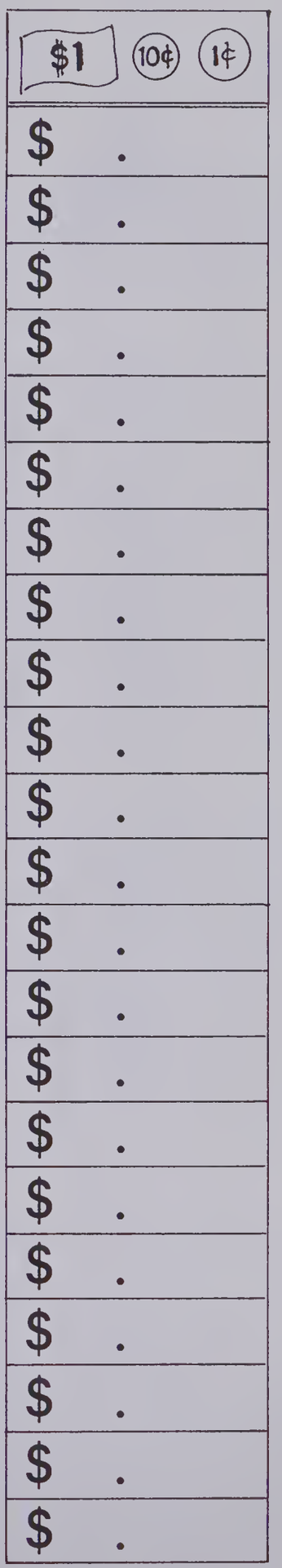
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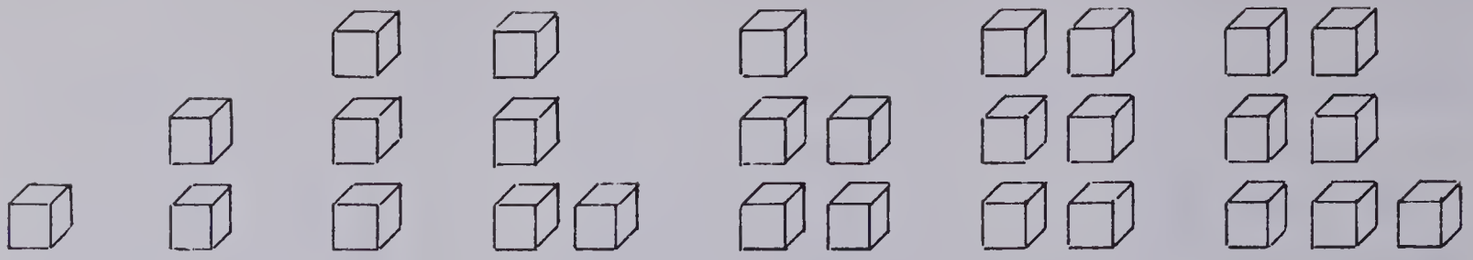


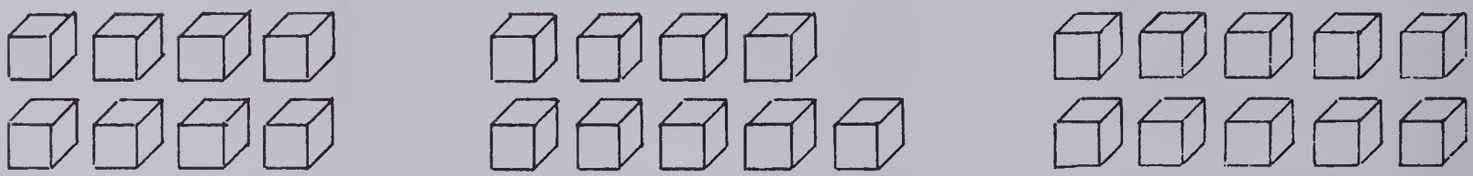
Name _____

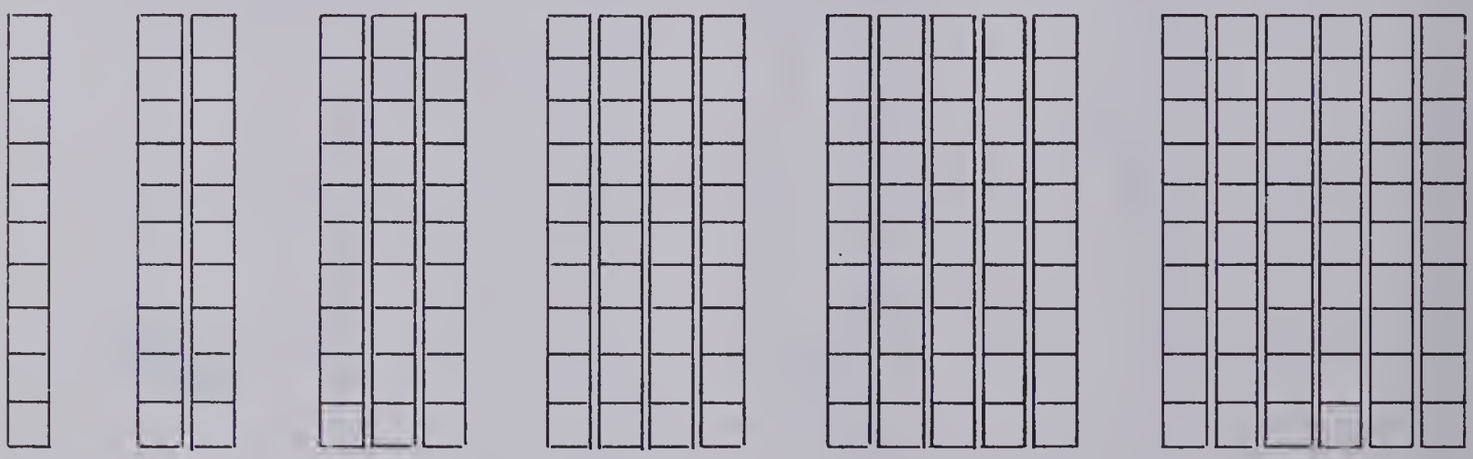


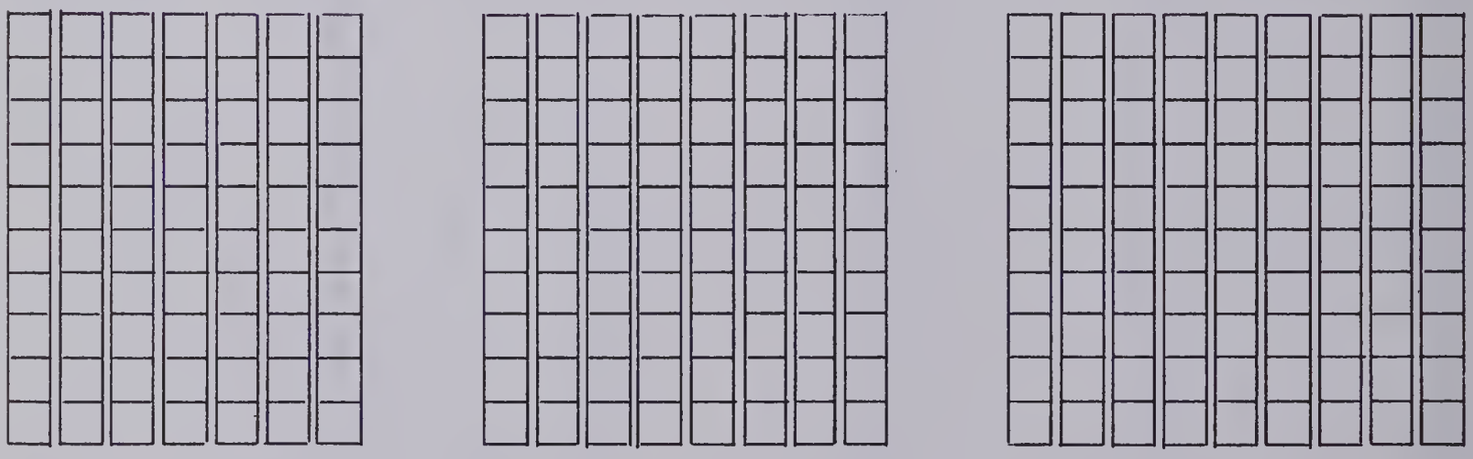


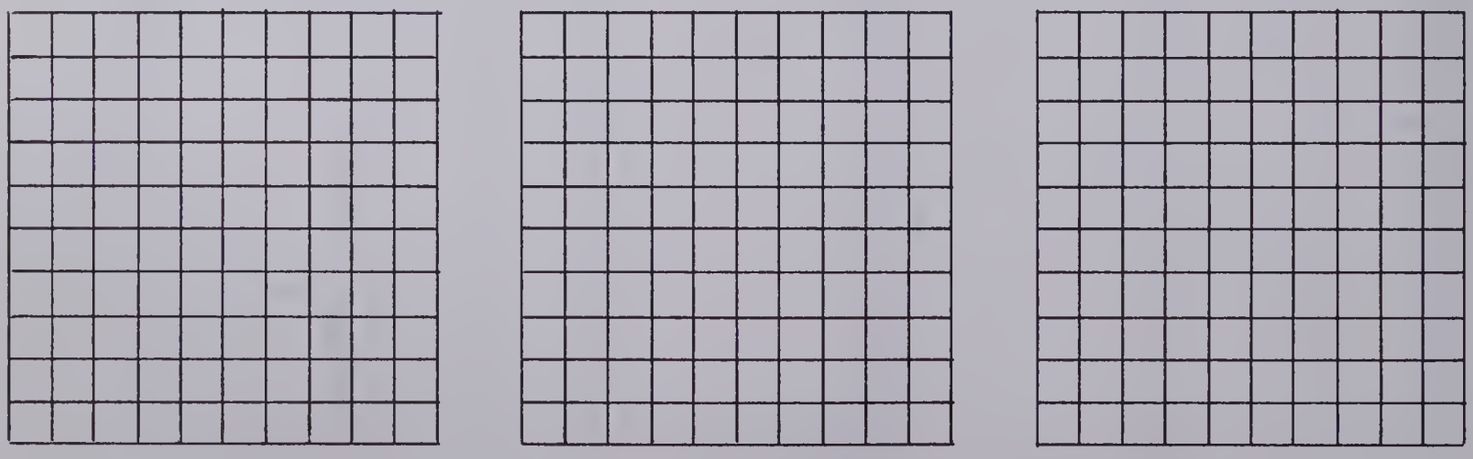












Name _____

Pretest **Unit 6**

What is the number?

5 hundred = 500

 = 263

h	t	o
3	7	1

= 371

 = 109

Which is less?

(482) or 521

(347) or 361

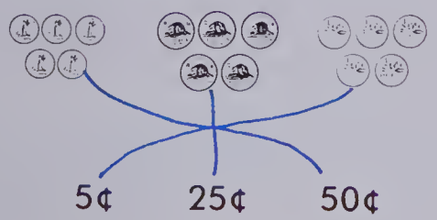
(653) or 858

(529) or 592

Keep counting.

257	258	259	260	261	262
697	698	699	700	701	702
5	10	15	20	25	30
140	150	160	170	180	190

Match these.



How much?



$1.35

Name _____

Post-test **Unit 6**

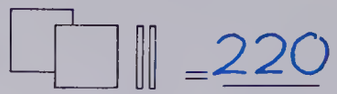
What is the number?

8 hundred = 800

 = 126

h	t	o
4	0	8

= 408

 = 220

Which is greater?

(483) or 299

478 or (487)

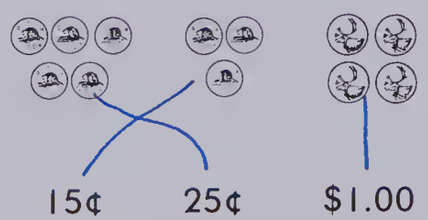
(346) or 287

372 or (374)

Keep counting.

167	168	169	170	171	172
697	698	699	700	701	702
5	6	7	8	9	10
160	161	162	163	164	165

Match these.



How much?



$2.12

UNIT 6 LESSON 1

Objective N18

Count by hundreds to 900.

Vocabulary

Hundred, ten, count by hundreds

Direction words:
- How many?
- Join the dots.
- Count by 100s.

Materials

Base 10 blocks: 10s and 100s

Introducing the Lesson

Use the number blocks to count orally by tens to 100. Compare the size of the 100 block and the 10 block. Demonstrate that *10 tens = 100* by forming ten 10 rods into a 100 flat.

Discuss situations in which the number 100 may be needed.

- 100 children in 3 or 4 classes
- 100 floor tiles in 10 by 10 area
- 100 marbles in a bag
- 100 pennies traded for a dollar

Teaching the Lesson

Using the place-value materials, count orally together from 100 to 900 by hundreds. Let individuals demonstrate this process for the group.

Print *hundred* on the chalkboard. Practise spelling *hundred*.

Using the place-value materials, complete a chart similar to the one in the workbook. Do not stress place value in this treatment; stress instead the visual and aural patterns.

visual: ☐☐☐☐☐☐ 6 hundred 600
aural: *6 hundreds 6 hundred 6 hundred*

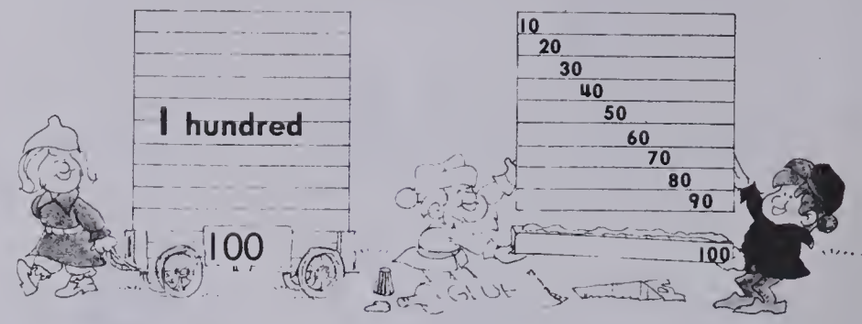
Discuss the following questions at the chalkboard.

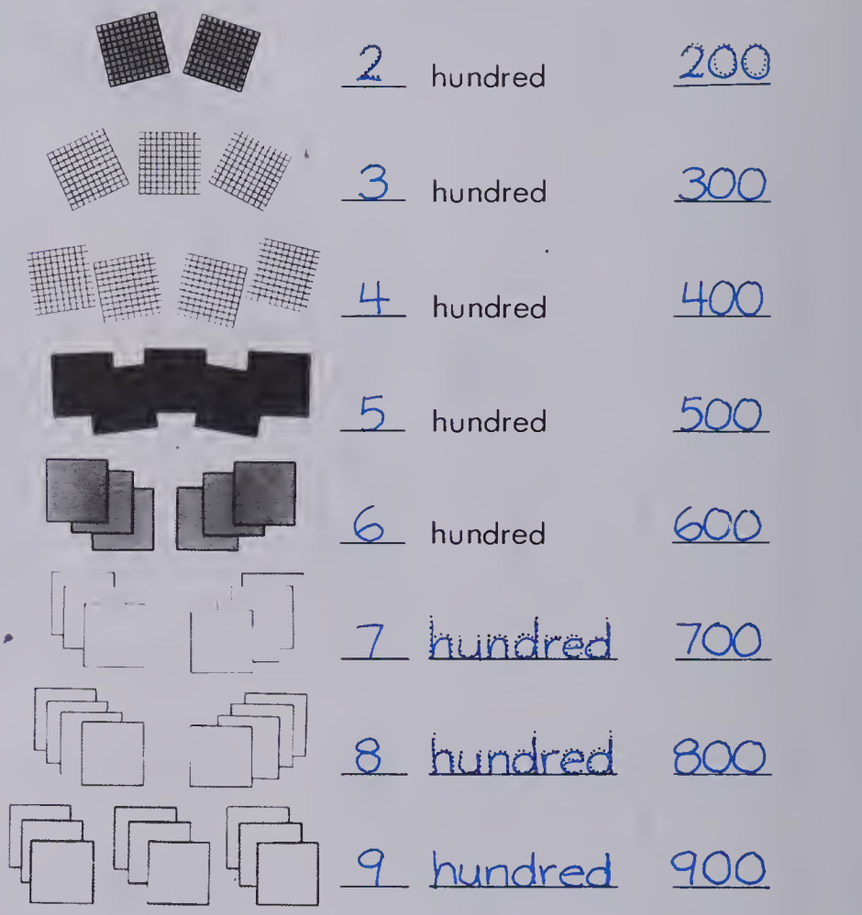
4 ☐ = ____ 700 = ____ ☐

5 hundreds = ____ 400 = ____ hundreds

Have the students count forward quickly by 100s to 900. Practise counting backwards from 900 by 100s.

UNIT 6 Name _____





2	hundred	200
3	hundred	300
4	hundred	400
5	hundred	500
6	hundred	600
7	hundred	700
8	hundred	800
9	hundred	900

Hundreds

one hundred nine 109

Using the Pages

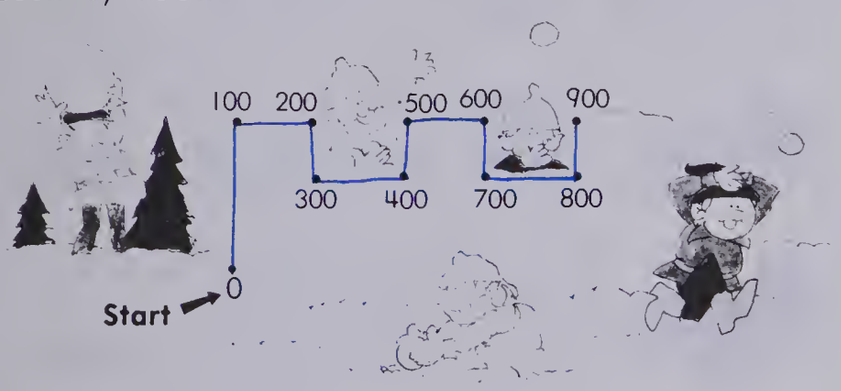
- Relate the exercises to the work done in groups. Allow the students to use number blocks.
- Encourage the students to finish colouring the dot-to-dot puzzle.

How many?

2	▦	= 200	8	▦	= 800
6	▦	= 600	5	▦	= 500
3 hundred		= 300	4 hundred		= 400
7 hundred		= 700	9 hundred		= 900

400 = 4	■	100 = 1	■
700 = 7	■	500 = 5	■
200 = 2 hundred		600 = 6 hundred	
800 = 8 hundred		300 = 3 hundred	

Join the dots.
Count by 100s.

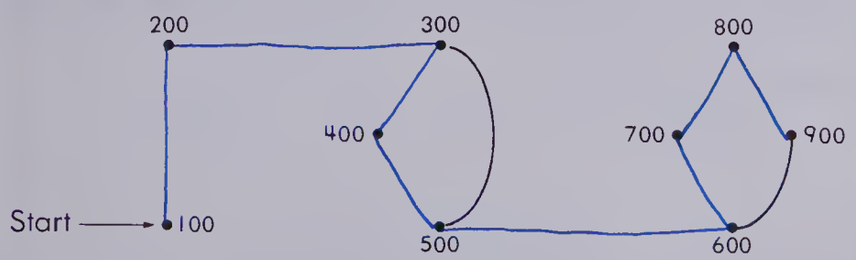


Extra Practice

Worksheet N18

Pages 109-110

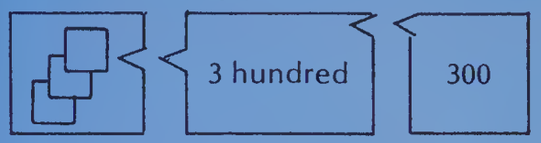
Join the dots.
Count by 100s.



100 200 300 400 500
600 700 800 900

Reinforcement

1. On cards 10 cm wide, construct a set of hundreds matching cards. Use a uniformly-shaped, self-checking notch. (For example, for **300**, locate the notch 3 cm from the top.)



2. Have the students convert some dot-to-dot puzzles to a count-by-100s format. This task will reinforce the similarities of counting by 1s and 100s and it implicitly introduces the positional nature of place values.

4 becomes **400**

Enrichment

Challenge the students to complete the pattern below. Discuss the pattern using number blocks. Focus on 10 tens = 100 as the unifying idea.

10 tens = 100
20 tens = 200 ← (since two sets of 10 tens equal two hundred)
__ tens = ___
•
•
•

UNIT 6 LESSON 2

Objective N19

Identify and write numerals to 999.

Vocabulary

Table form, standard form, hundreds place

Direction words:
How many?

Materials

Place-value materials
Place-value tables

Introducing the Lesson

Use materials to review place-value equations such as the following.

3 hundreds	= 300	7 hundreds	= 700
6 tens	= 60	2 tens	= 20
5 ones	= 5	4 ones	= 4

Teaching the Lesson

Demonstrate problems similar to those in the workbook. Use place-value materials to practise translating from concrete models to **table form**, to **standard form**, and finally to **oral form**.



h	t	o
2	3	4

234 ⟶ *two hundred thirty-four*

Have the students read these number sequences.

a.	260	360	460	560	660
b.	273	283	293	303	313
c.	427	428	429	430	431

Focus on examples containing zeros. Explain that the symbol 0 must be used in the tens place if there are no tens and in the ones place if there are no ones. Use materials to discuss and contrast with these examples.

(360 306 36) (960 906 96)

Ask questions such as:
"How many tens are in 752?"
"Which number has 6 hundreds: 360, 62, 612?"

Name _____



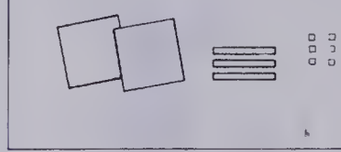
2 hundreds



5 tens

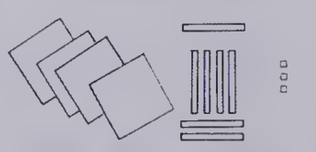


3 ones



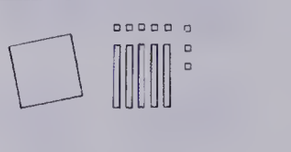
hundreds	tens	ones
2	3	6

236



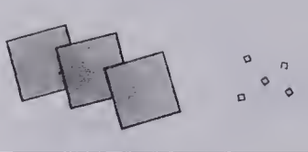
hundreds	tens	ones
4	7	3

473



hundreds	tens	ones
1	5	8

158



hundreds	tens	ones
3	0	5

305



hundreds	tens	ones
4	1	4

414

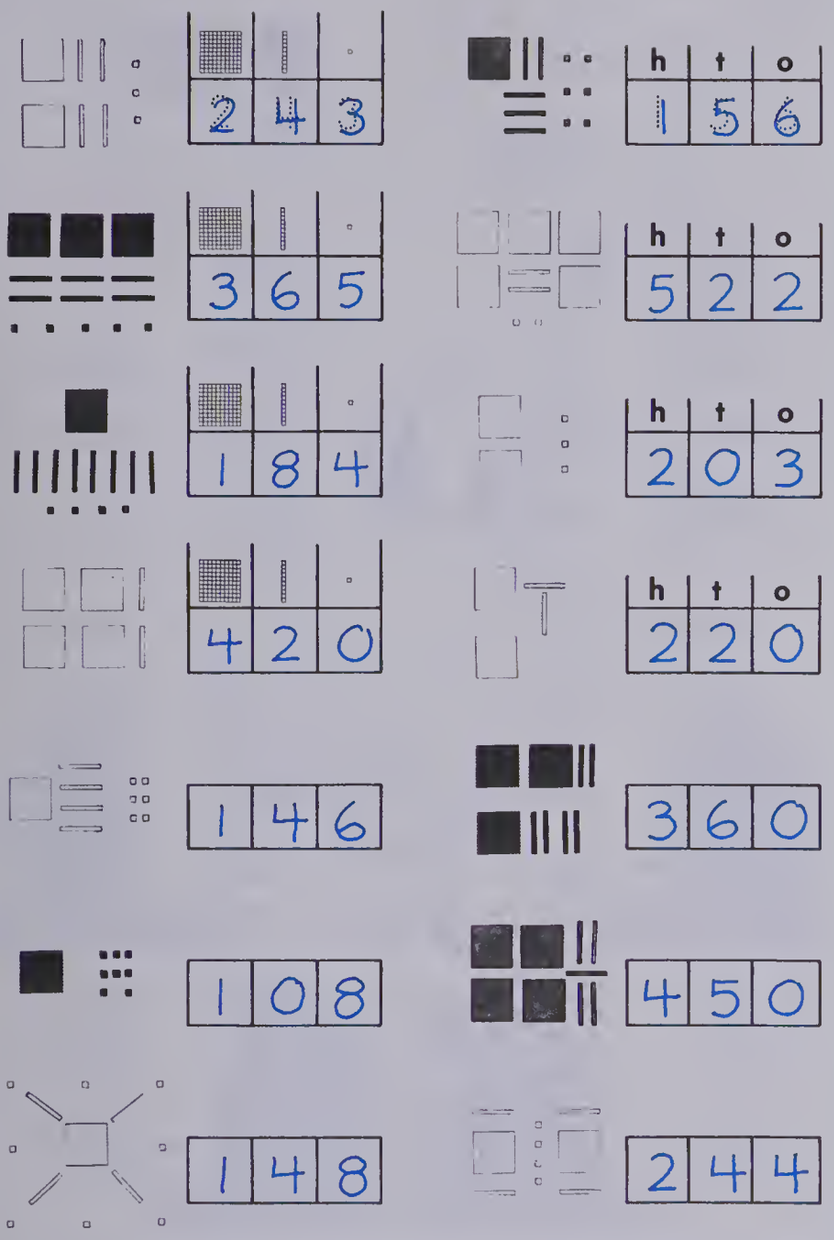
Hundreds, tens, and ones

one hundred eleven 111

Using the Pages

- Most students will require a great deal of concrete and pictorial experience before this objective is mastered. It is recommended that such experience both precede and follow the assignments on pages 111 and 112. Suggestions are given in the Reinforcement section. The "place-value pig" may be used with the lesson and the assignments.
- Allow the students to use number blocks.

How many?



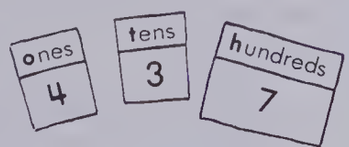
Extra Practice

Worksheet N19
Pages 111-112

Print the numeral.



362



734



538 763 240 842

Reinforcement

1. Numbers can be represented in many forms. The place-value representations with which students should be conversant are concrete, pictorial, table, standard, oral. Practise the possible translations among these important number representations. Translation activities can be organized in various ways, e.g., teacher-produced work cards can be used to start. Asking students to generate examples allows for investigation and discussion. ("Build 5 numbers with your blocks. Print the numbers with a table. Then print the numbers without a table.") Here is a hypothetical sequence.

Day 1:
concrete → table → standard (student generated)

Day 2:
pictorial → standard → oral (work cards)

Day 3:
concrete → standard → oral (student generated)

Day 4:
oral → standard → concrete (partners, tape recorders)

2. An invaluable resource for the pictorial representation of numbers to 999 is *Picturing Numeration* (Creative Publications).

3. Place-value cards assist students with translation to standard form. A common error of students is printing 600403 for *six hundred forty-three*. Working with symbolic manipulatives helps prevent this error.



(overlap cards)

Enrichment

Written form may be introduced as an enrichment topic. Challenge the students to translate *from* written numbers and *to* written numbers.

two hundred sixty one ⟶ 261
437 ⟶ four hundred thirty-seven

A set of worm puzzles makes this task more enjoyable.



UNIT 6 LESSON 3

Objective N20

Compare numerals to 999.

Vocabulary

Compare, greater, less, smaller

Direction words:
Which is greater?
Colour the monster with the smaller number.

Materials

Place-value materials

Introducing the Lesson

Type 1 Comparisons: different hundreds

Compare 421 and 162 using materials. Discuss how 421 makes a larger pile than 162 (if the materials are arranged neatly).

Teaching the Lesson

Type 2 Comparisons: same hundreds, different tens

Use materials to discover that if the hundreds of two numbers are the same, the comparison of the tens establishes which number is greater.

Type 3 Comparisons: same hundreds, same tens, different ones

Establish a comparison procedure using materials.

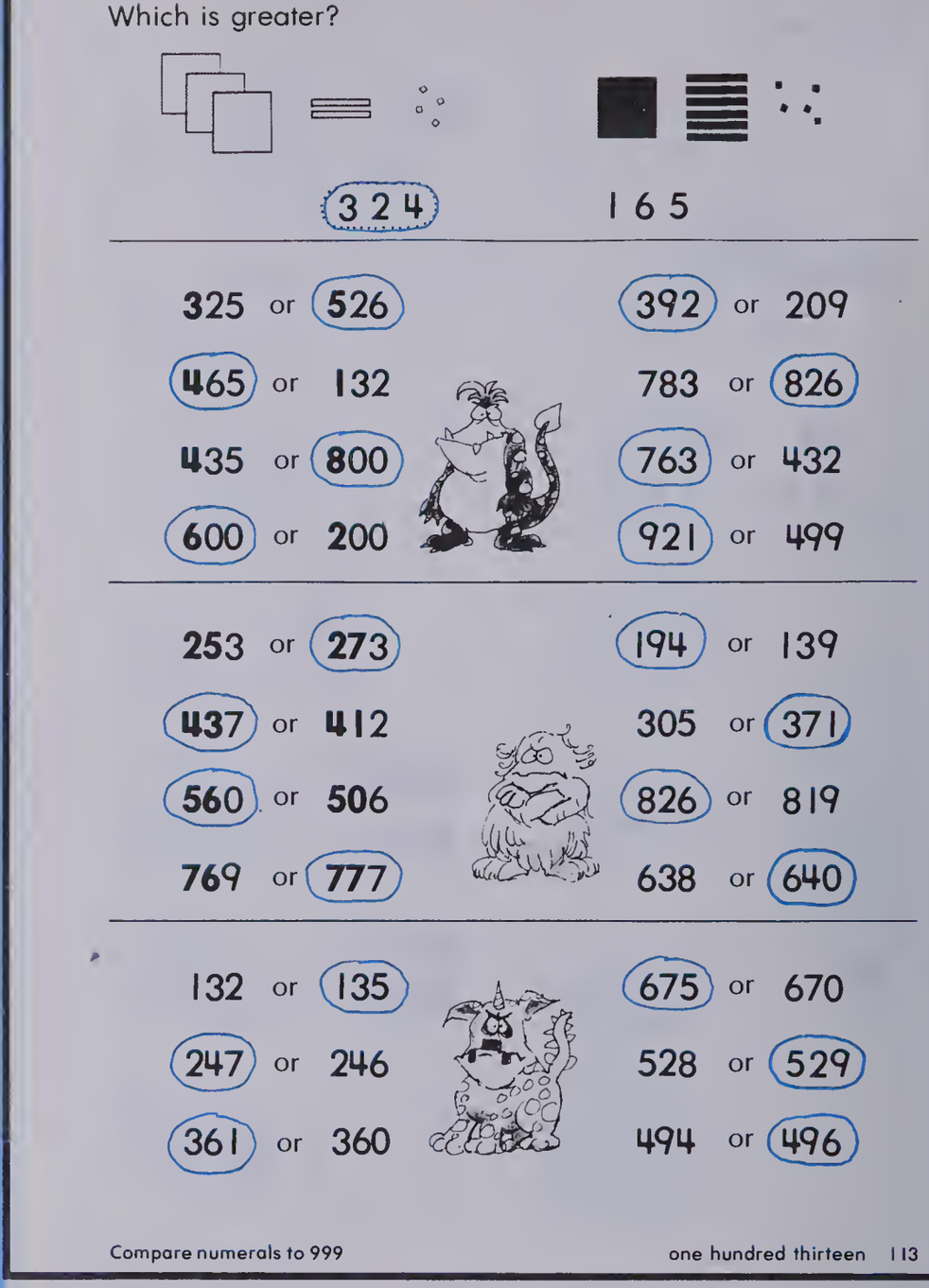
A pointing method can also be used to compare numbers.

1. Two fingers are pointed simultaneously at the hundreds and tens, (for example, 370 is greater than 365, since 37 is greater than 36).



2. The comparison fingers are moved from the hundreds to the tens to the ones (for example, 370 is greater than 365, since 7 tens are greater than 6 tens).

Practise the chosen technique extensively with a mixture of Type 1 and Type 2 examples.



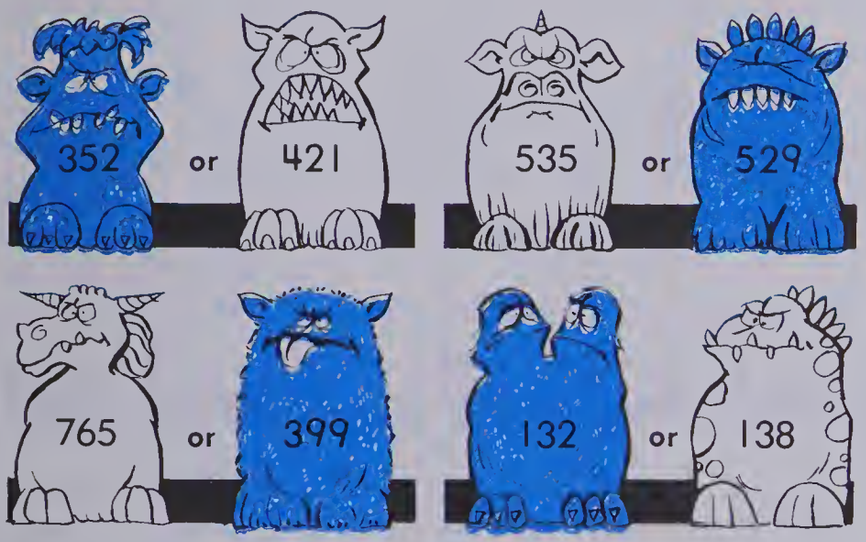
Using the Pages

- The three sections on page 113 correspond to the three types of comparisons discussed in the lesson. On page 114, students must compare pairs of three-digit numbers that are not organized in any way. You may wish to assign pages 113 and 114 on separate days.
- Encourage the students to make finger puppets from the monsters on page 114. Details are found in the Enrichment section.

Which is greater?

356	298	730	821
529	539	672	670
732	731	156	159
199	400	705	690
265	276	352	349
266	265	342	340
735	835	304	209

Colour the monster with the smaller number.



Compare numerals to 999

Extra Practice

Worksheet N20

Pages 113-114

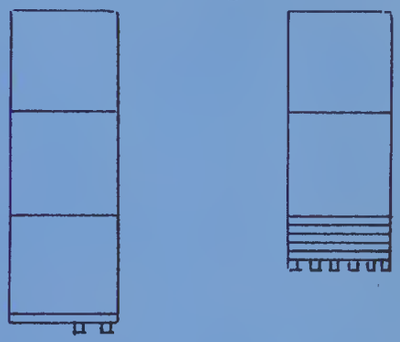
Which is less?

356 or 329	463 or 468	472 or 500
206 or 199	235 or 234	745 or 781
909 or 920	604 or 607	325 or 253
432 or 768	653 or 365	287 or 199
98 or 105	466 or 646	352 or 53

Reinforcement

1. Relating number concepts and measurement concepts strengthens both ideas for students. Provide a selection of work cards which ask students to compare numbers by comparing the size (measure) of models.

"Which is greater?" *312 is greater than 256.*



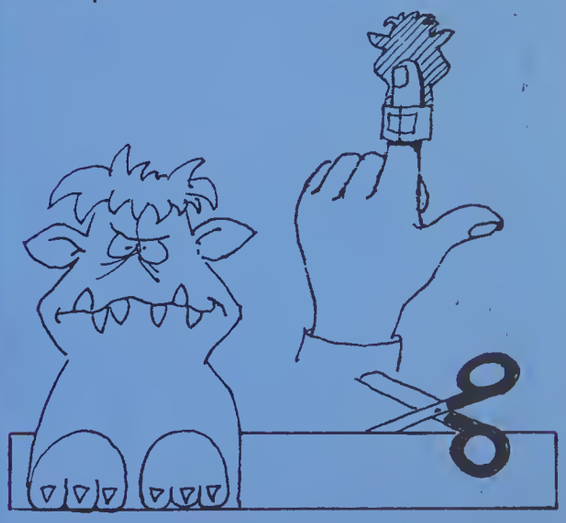
2. Ask the students to help you construct "comparison hinged work cards" as shown below. Tape together two index cards. Draw or paste a friendly monster picture on the back of the correct numeral. A student picks an answer and checks it by folding over the chosen answer.

Which	is less?
385	or 297



Enrichment

1. The monsters on page 114 can be made into finger puppets. Cut out each coloured monster and its band. Wrap the band loosely around a finger and tape it.



2. Play the number line race described in the next lesson.

UNIT 6 LESSON 4

Objective N21

Count to 999.

Vocabulary

Pattern

Direction words:
- Trade 10 ones for 1 ten.
- Trade 10 tens for 1 hundred.
- Count by 1s.

Materials

1	6	8
1	6	9
1	7	0

Place-value materials and grids
Vertical counting ladders
Rolls of paper such as cash register tapes
Scissors, felt markers, tape

Introducing the Lesson

On the first day, prepare the students for page 115 (passing decade barriers).

Review concepts and skills for counting to 99 (see Unit 3).

Teaching the Lesson

On the second day, prepare students for page 116 (passing century barriers).

Demonstrate these equivalences with materials.

10 ones = 1 ten = 10
10 tens = 1 hundred = 100

Recall that 1 more than 99 is 100.

Use materials on a grid and on vertical counting ladders to practise these counting sequences.

95 to 110	195 to 210
488 to 505	888 to 905

To demonstrate the passing of the hundred barrier (e.g., 199 to 200) with materials, follow this procedure.



Start.



Add 1 more.



Trade 10 ones for 1 ten.



Trade 10 tens for 1 hundred.

Name _____



Count by 1s.

100	10	1
1	6	7
1	6	8
1	6	9
1	7	0
1	7	1
1	7	2

100	10	1
3	6	7
3	6	8
3	6	9
3	7	0
3	7	1
3	7	2

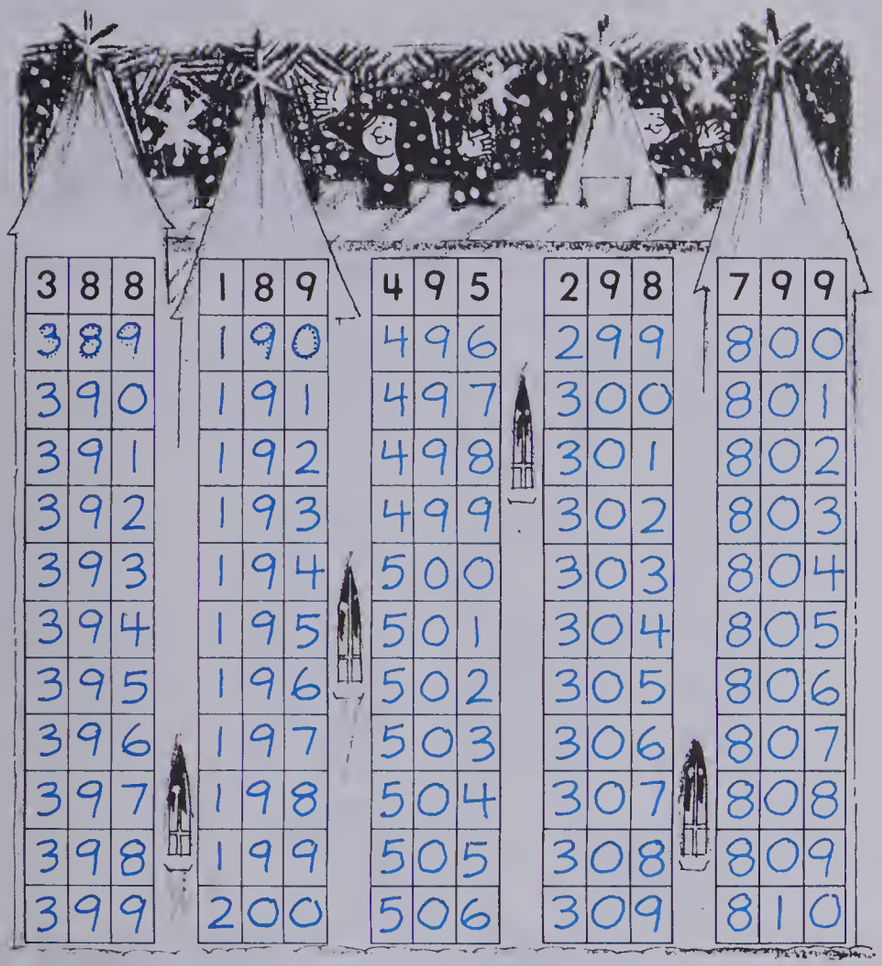
100	10	1
4	2	7
4	2	8
4	2	9
4	3	0
4	3	1
4	3	2

100	10	1
7	8	7
7	8	8
7	8	9
7	9	0
7	9	1
7	9	2

267	268	269	270	271	272
186	187	188	189	190	191
928	929	930	931	932	933
569	570	571	572	573	574
SWIRLS	SWIRLS	SWIRLS	SWIRLS	SWIRLS	SWIRLS

Using the Pages

- Counting in the hundreds requires considerable practice. It is recommended that pages 115 and 116 be assigned on separate days or as follow-up assignments. Manipulation of place-value materials is encouraged at all stages.
- For this important topic, you may find it useful to precede and follow the workbook assignments with activities as discussed in the Reinforcement section.



388	389	390	391	392	393	394	395	396	397	398	399

189	190	191	192	193	194	195	196	197	198	199	200

495	496	497	498	499	500	501	502	503	504	505	506

298	299	300	301	302	303	304	305	306	307	308	309

799	800	801	802	803	804	805	806	807	808	809	810

One More

270	271
569	570
409	410

484	485
189	190
399	400

219	220
99	100
599	600

Extra Practice

Worksheet N21
Pages 115-116

Find **one less** and **one more**.

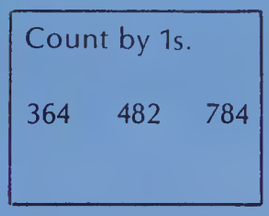
123	124	125
429	430	431
798	799	800
198	199	200
399	400	401

236	237	238
588	589	590
808	809	810
298	299	300
499	500	501

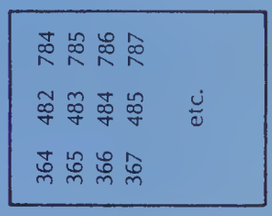
348	349	350
679	680	681
978	979	980
347	348	349
598	599	600

Reinforcement

1. Reproduce copies of the counting ladder worksheet found in the introduction to this unit. Have students choose a starting number for each ladder. Alternatively, assign numerals either directly or via self-checking work cards.



Front



Back

2. Make a number line to 1000 as a class project. You will need several rolls of cash register tape, scissors, felt markers, and masking tape. Cut the paper into 2 m sections. Print a different number at the beginning of each. (If you have 25 students, count by 40s to find the starting numbers for each part of the number line. If you have 30 students, count (roughly) by 33s: 1, 33, 66, 99, 133, 166, 199, etc.) Give the students time over several days to complete the sections of the number line. Check their preliminary work for errors.



Plan to have an older student helper on the day you begin to assemble the number line. There are bound to be gaps in the number line that need to be filled in and overlapping sections that need to be trimmed away. Also, the sections must be placed in order. The number line, which will be about 50 or 60 m long, is taped to the hallway baseboard.

Enrichment

A number line race is an exciting event for all students. Hand out numbers on index cards to not more than 10 students. Each student prints his or her initials on the back. At a signal, the students locate their numbers along the number line to 1000, place their cards beside the appropriate numbers, and return to the finish line. The first person back is the winner. (Note: This very popular game requires many comparison decisions.)

UNIT 6 LESSON 5

Objective N22

Count by 10s to 999.

Vocabulary

Pattern

Direction words:
- Count by 10s.
- Trade 10 tens for 1 hundred.

Materials

Place-value materials and grids
Vertical counting ladders
Counting by 10s cards 10 20 30 ... 980 990
Metre sticks

Introducing the Lesson

Distribute count by 10s cards so that each student receives one. Have the students arrange themselves in order from smallest number to largest number. As the students say their numbers, record the results on a large vertical counting ladder. Pause to discuss any difficulties that arise. Repeat this procedure for the rest of the count by 10s cards (this may take 5 turns).

Refer to the counting ladder just made. Ask the students to describe the number patterns:

- in the ones place: 210, 220, 230,... (all zeros)
- in the tens place: 210, 220, 230, 240,... (count from 0 to 9 repeatedly)
- in the hundreds place: 770, 780, 790,.. (change at every tenth number).

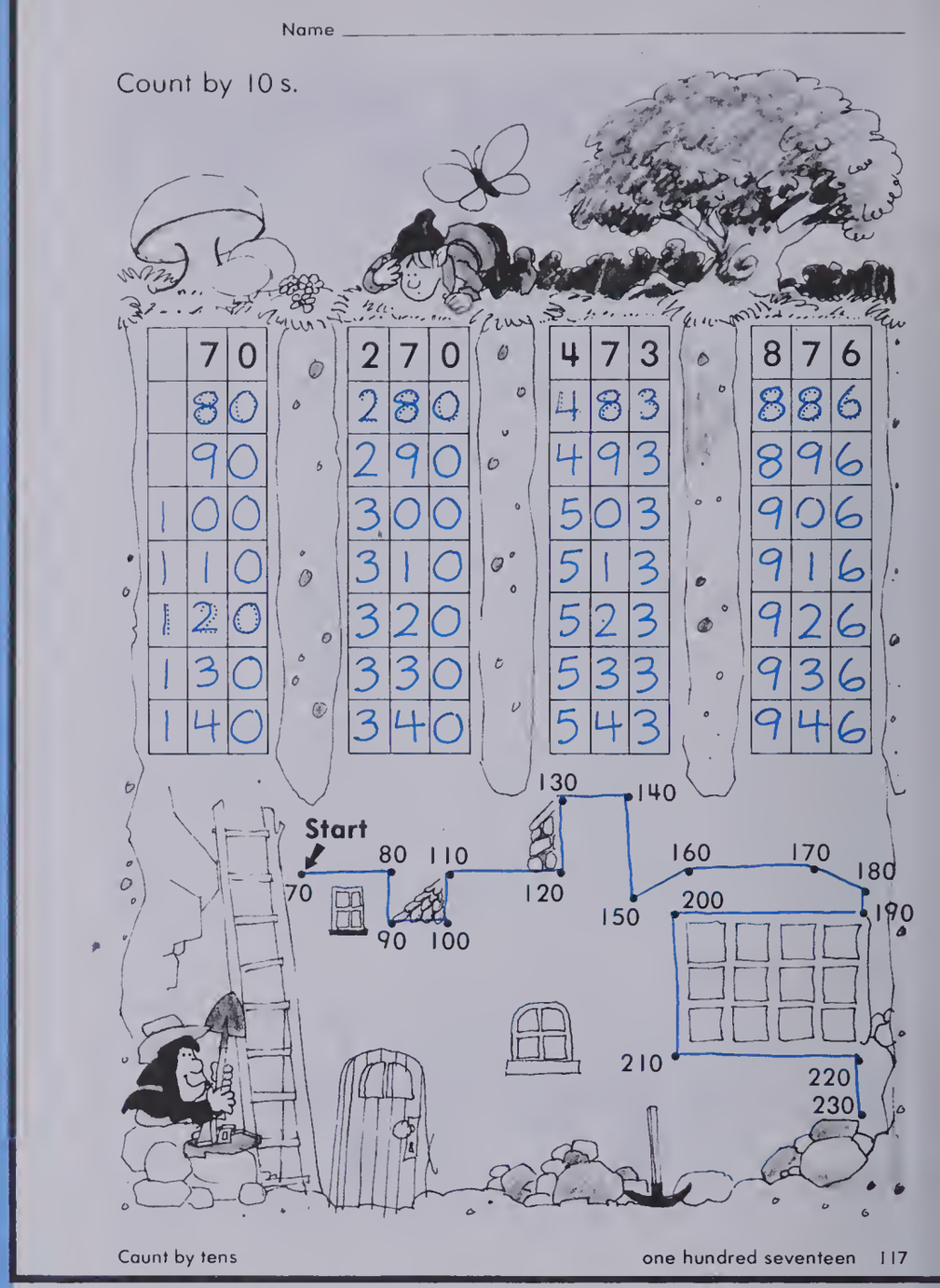
Teaching the Lesson

Demonstrate counting by 10s with materials using a counting ladder.

460 to 550, 173 to 233, 577 to 637

Stress the trading of 10 tens for 1 hundred.

Demonstrate how counting by tens is very similar to counting by ones. Refer to one of the counting ladders just completed. Cover the numbers in the ones place. Discover that the remaining digits appear to show counting by ones.



Using the Pages

- As with the previous lessons in this unit, workbook pages 117 and 118 may be used as follow-up assignments.
- Allow students to use place-value materials for page 117. Point out the number pattern found in the chart on page 118. Ask students to read aloud with a partner the numerals in the chart when they have finished.

Count by 10s.

10	20	30	40	50	60	70	80	90	100
110	120	130	140	150	160	170	180	190	200
210	220	230	240	250	260	270	280	290	300
310	320	330	340	350	360	370	380	390	400
410	420	430	440	450	460	470	480	490	500

Count by 1s.

85 86 87 88 89 90

387 388 389 390 391 392

797 798 799 800 801 802

126 127 128 129 130 131

598 599 600 601 602 603

Extra Practice **Worksheet N22**

Pages 117-118

Count by 10s. Colour the path from 10 to 390.

10	30	140	260	170	180	190	400	370	380	390
20	30	160	150	160	170	200	300	360	470	340
150	40	150	140	240	220	210	360	350	340	330
60	50	220	130	240	230	260	370	30	400	320
70	160	110	120	250	240	250	300	290	300	310
80	90	100	200	260	350	260	270	280	390	500

Reinforcement

1. Determine that there are 10 tens from 0 to 100, from 100 to 200, etc., and that there are 100 ones from 0 to 100, from 100 to 200, etc. Use several metre sticks as number lines to illustrate these important facts. Name each stick as a particular hundred and mark each decade.

10 20 30 40 50 60 70 80 90

3 hundred

10 20 30 40 50 60 70 80 90

4 hundred

Practise counting orally by 1s and 10s. Refer to the number line model if difficulties arise.

2. Reproduce copies of the counting ladder worksheet found in the introduction to this unit. Let the students choose a starting number for each ladder. Alternatively, assign numerals either directly or via self-checking work cards.

Count by 10s.

250 253 15

Front

15 25 35 45 55

253 263 273 283 293 etc.

250 260 270 280 290

Back

3. Ask the students to draw a blue rectangle around every tenth number of the number line to 1000 constructed in the previous lesson. (See page 116, Reinforcement.)

40 41 42 43 44 45 46 47 48 49 50 51 52

Allow partners to go on the 10s stroll: the students walk the entire length of the number line saying aloud the numbers contained in the rectangles.

Enrichment

1. Practise counting backwards by 10s. Allow the students to use concrete materials, counting ladders, and the number line to 1000.

2. Have the students convert commercially-produced dot-to-dot puzzles to counting by 10s exercises by appending a 0 (or any other constant digit) to the right of each number.

UNIT 6 LESSON 6

Objective N23

Count by 5s to 999

Vocabulary

Pattern

Direction words:
Count by 5s.

Materials

Vertical counting ladders
Counting by 5s cards [5] [10] [15]...[100]

Introducing the Lesson

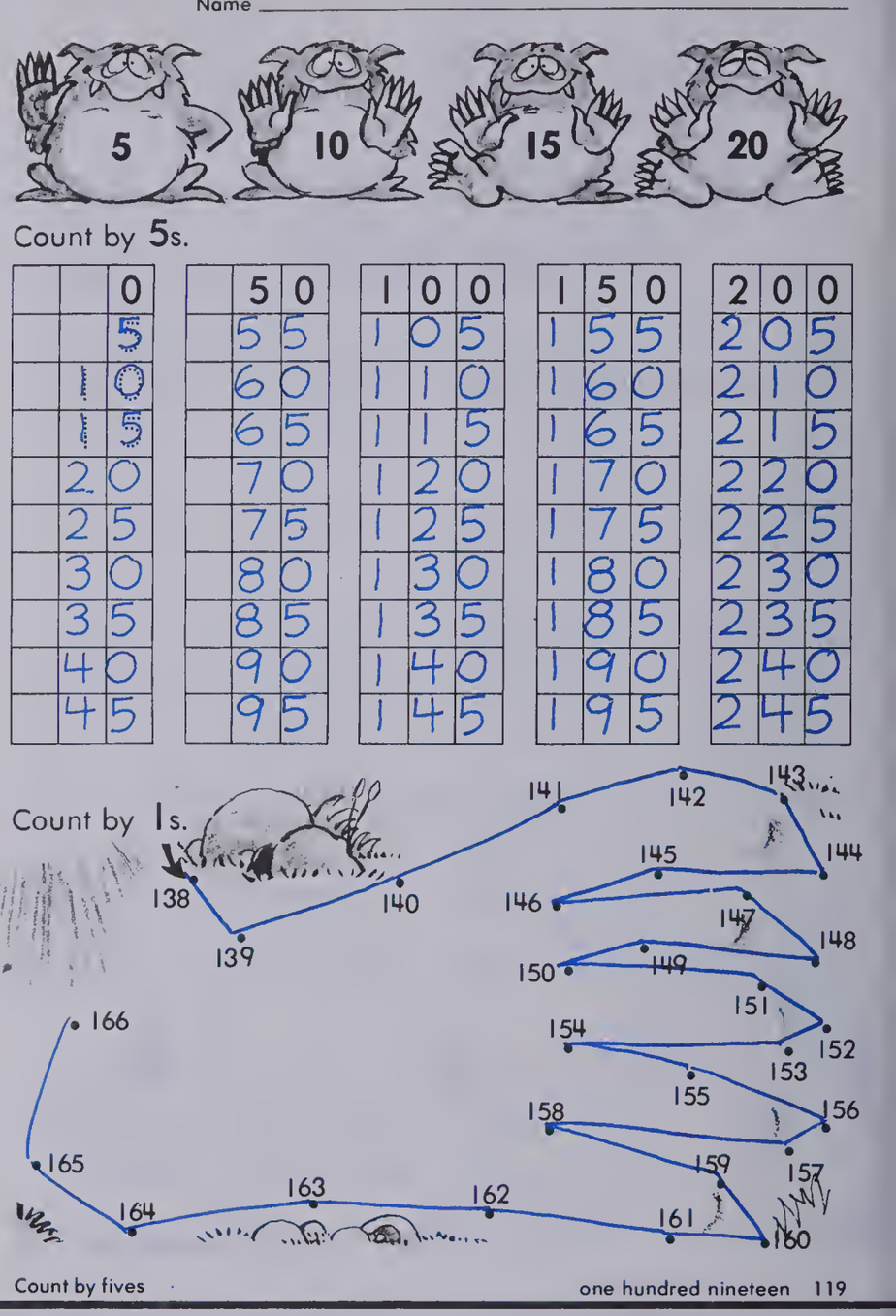
Choose 5 children to be monsters. Attach the counting by 5s cards to the students' hands and shoes with rubber bands so that a sequence exists from 5 to 100. As the numbers are slowly revealed, in order, let the students create the chant below as each monster pantomimes the characterization. Ask the students why the hand and foot movements were picked for this chant. (Five fingers on each hand and five toes on each foot relate to counting by fives.)

5, 10, 15, 20 What a cute monster!
Isn't he (funny, sunny)!
25, 30, 35, 40 What a cute monster!
Isn't he (warty, furry)!
45, 50, 55, 60 What a cute monster!
Isn't he rickety!
65, 70, 75, 80 What a cute monster!
Isn't he a-fraidy!
85, 90, 95, 100 What a cute monster!
Isn't he a wonder!

Teaching the Lesson

As the students count orally by 5s from 0 to 100, record the numbers vertically on counting ladders. Discuss the number patterns that arise (e.g., the ones digit repeats 0, 5, 0, 5,...; the tens digit builds 1, 1, 2, 2,...; when the tens digit changes, the ones digit becomes a 0).

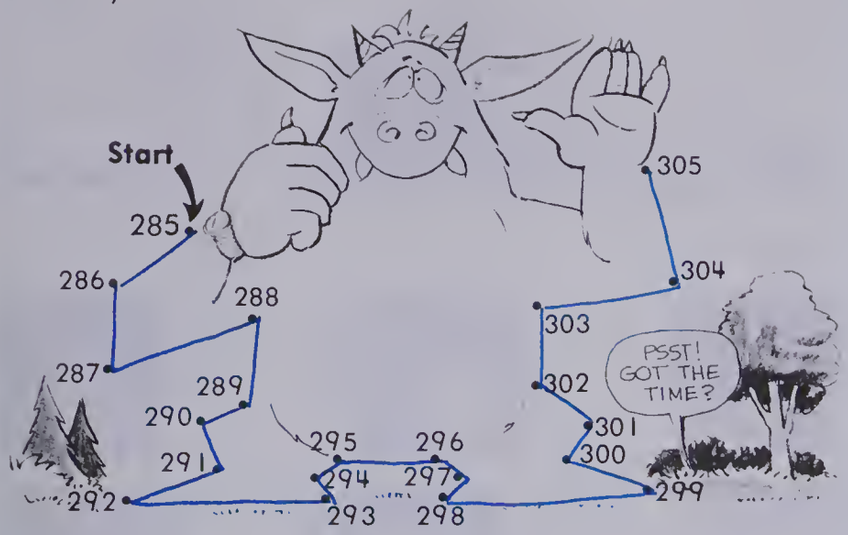
Show the students how counting above 100 by 5s is similar to counting below 100 by 5s. Change all numbers in the vertical counting ladder made above by 300 as the students count orally (i.e., [][2][5] becomes [3][2][5]).



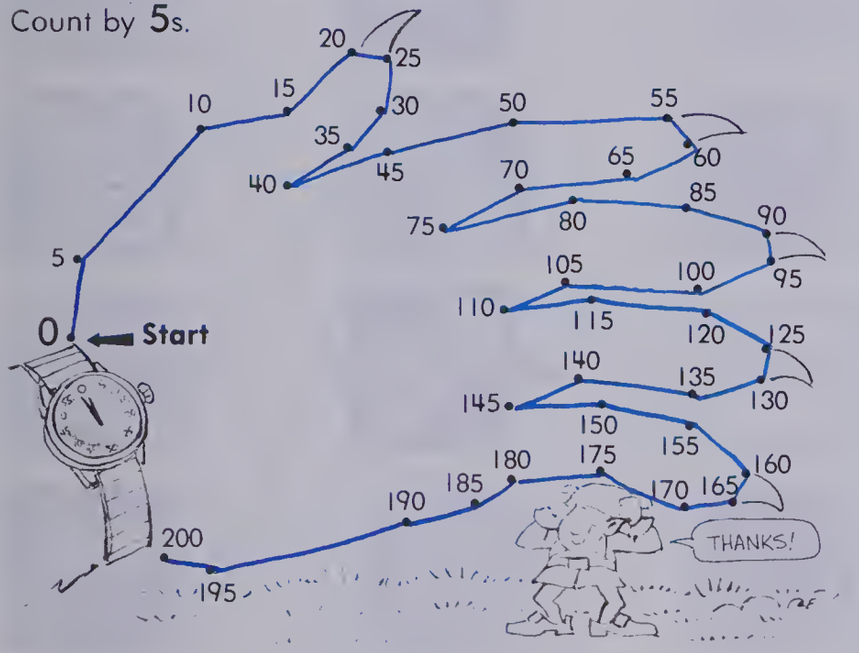
Using the Pages

- The pictures of hands and feet on pages 119 and 120 are to remind students of our concrete connection with "fiveness". (Of course, the use of 10 for the base 10 system is also related to the human characteristic of 10 fingers.)
- You may wish to provide place-value materials for the counting exercises on pages 119 and 120. Alert the students to the counting by 1s dot-to-dot puzzles.
- Note the cartoon on page 120. Point out the use of counting by 5s on the monster's watch and on your classroom clock (if applicable).

Count by 1s.



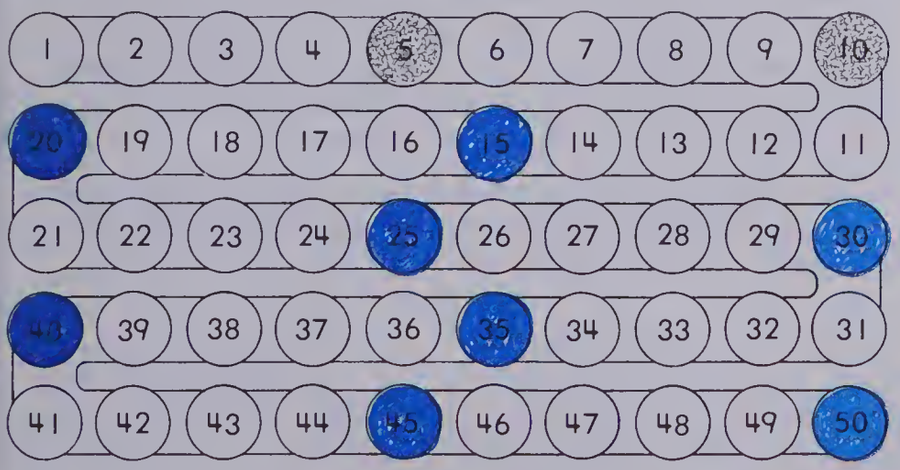
Count by 5s.



Extra Practice **Worksheet N23**

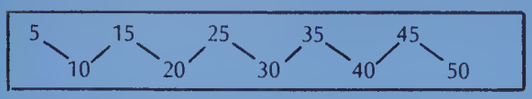
Pages 119-120

Colour every 5th number on the path.



Reinforcement

1. Record the numbers on the board as shown. Discuss the number patterns (e.g., the numbers above end in 5; the numbers below end in 0; the tens count from 1 to 9 in both rows).



2. Shuffle the counting by 5s cards. Have individuals or groups (one card to each student) put the cards in order.

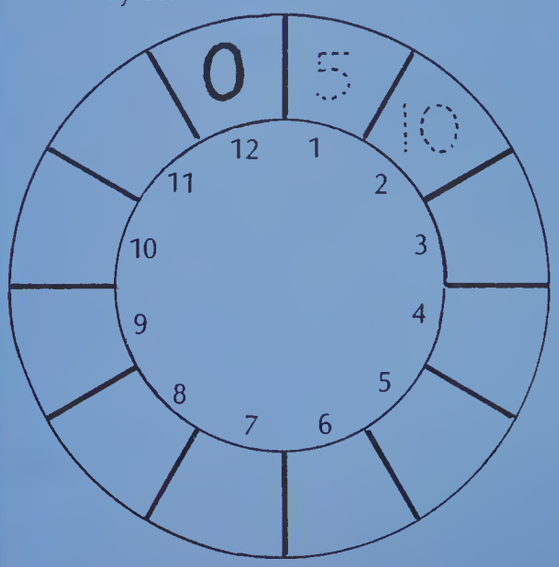
3. Ask the students to draw a green rectangle around every fifth number on the number line to 1000 constructed in Lesson 4. When this is completed, allow partners to take a 5s stroll (students walk the entire length of the number line saying aloud the numbers contained in the green rectangles).

Enrichment

1. Help the students to devise a movement exercise that features a counting by 5s chart. For example, use "5 (wiggle right hand), 10 (right foot), 15 (left hand), 20 (left foot),..." with percussion accompaniment.

2. Telling time to the five-minute interval is an objective of Unit 8. You may wish to prepare the students for reading the minute hand by having them complete counting by 5s exercises in the fashion shown below.

Count by 5s.



UNIT 6 LESSON 7

Objective M3

Determine the value of sets of nickels and sets of quarters.

Vocabulary

Nickel, 5 cents, quarter, 25 cents

Direction words:
Match these.
Match the amounts.

Materials

Nickels, quarters, dimes, and pennies
Brown and green crayons

Teaching the Lesson

Day 1: Nickels

Review the following skills.

1. Use dimes to count to one dollar by tens.

2. Use dimes and pennies to count to 30. Practise trading 10 pennies for 1 dime.

3. Use dimes and pennies to make amounts to 99¢. Relate exercises to concepts of place-value.

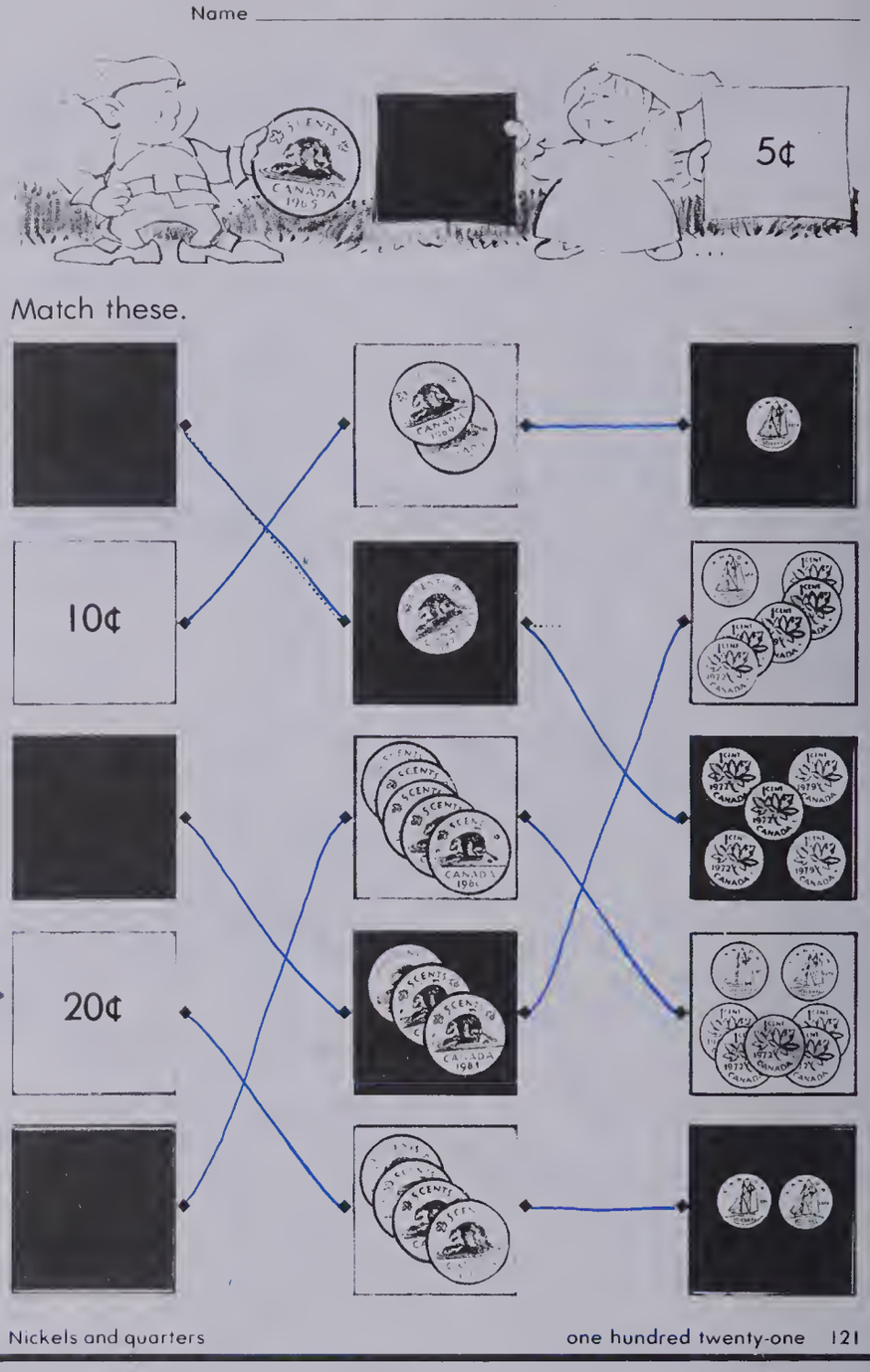
Establish the following facts through discussion and practice.
A nickel is worth 5¢.
A nickel can be traded for 5 pennies.
Nickels can be used to count by fives.
Two nickels equal 10¢ or a dime.
Five nickels equal 25¢ or a quarter.

Count forward and back by fives to 25 using nickels. Practise determining the value of sets of nickels to 25¢.

Day 2: Quarters

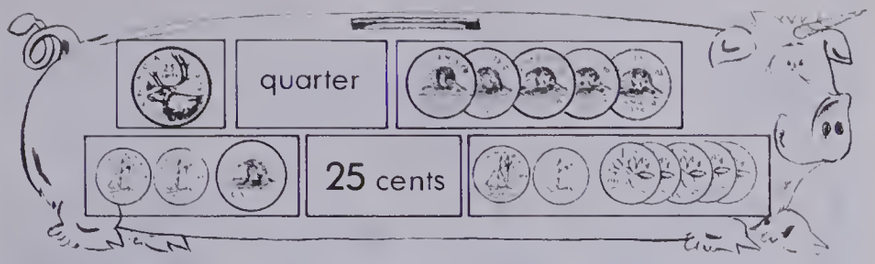
Establish the following facts through discussion and practice.
A quarter is worth 25¢.
A quarter can be traded for 2 dimes and 5 pennies, 2 dimes and a nickel, or 5 nickels.
Two quarters equal 50¢.
Four quarters equal $1.00 or one dollar.

Practise determining the value of sets of quarters to one dollar.

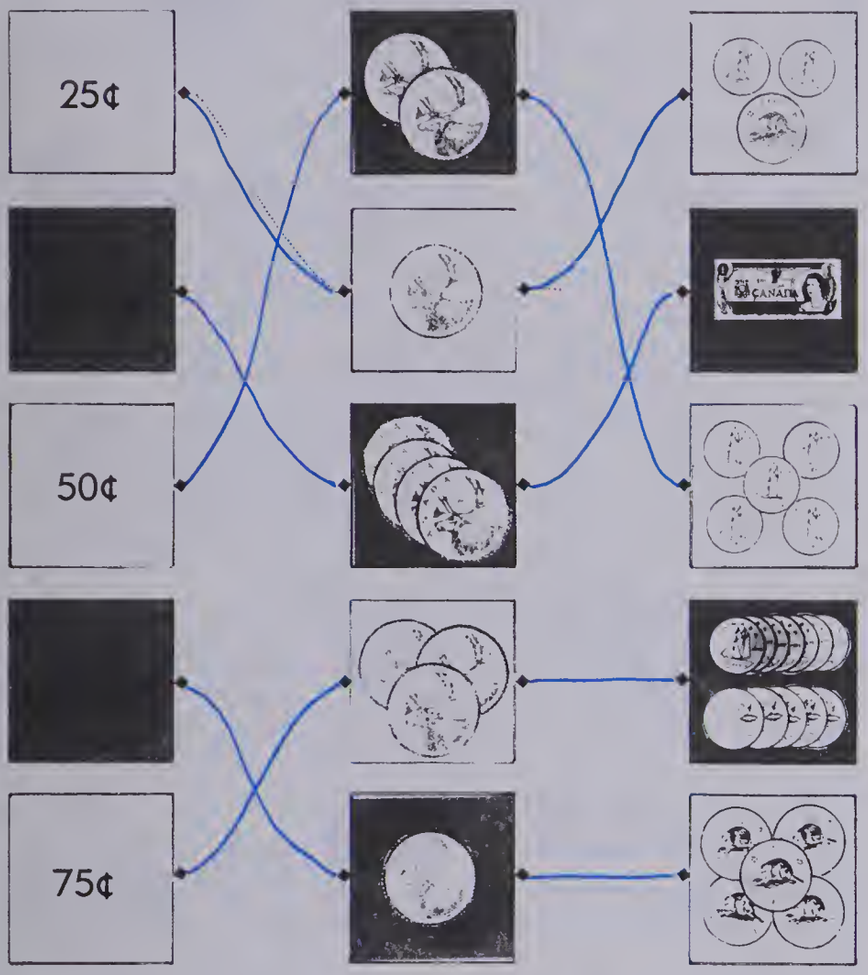


Using the Pages

- The workbook pages are designed as follow-up assignments. You may decide to assign pages 121 and 122 on different days.
- Show the students how to answer the first matching question using a brown crayon to match items in the first two columns and a green crayon to match items in the last two. This helps focus attention on the differences between column two (all nickels) and column three (dimes and pennies).
- Encourage the students to cut out the matching card set after their work has been checked (see the Reinforcement section).



Match the amounts.



Extra Practice **Worksheet M3**
Pages 121-122

How many cents?


= 10 ¢


= 25 ¢


= 20¢


= 50¢


= 25¢


= 75¢

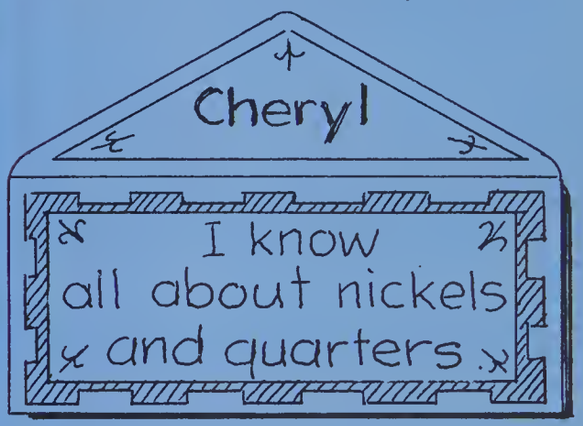
Reinforcement

1. Display a dollar, a quarter, a dime, a nickel, and a penny. Ask the students if they can solve these riddles.

"Even though I'm larger than a dime or a penny, I'm also less than a dime and more than a penny."
(Answer: nickel)

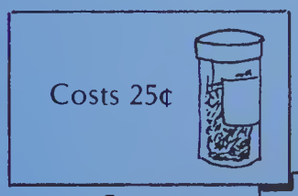
"I'm larger than a dime in worth and size. If you win four of me, you have a dollar prize." (Answer: quarter)

2. Cover page 121 with a sheet of transparent adhesive plastic. Cut out the 15 squares on page 121 (and, hence, those on page 122). The cards can be used for a matching activity. First, have participants find the five cards containing nickels (or quarters). The challenge is to locate two other cards to match the value of each nickel (or quarter) card. Sets of 15 cards may be sent home with students in decorated envelopes.



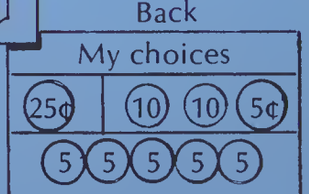
Enrichment

Provide a toy cash register, a collection of coins, and a set of "play store" work cards. Ask students to assist you in the preparation of the front side of the work cards. Try to get examples of ordinary store purchases which are evenly priced (multiples of 5¢) on the back of the work card, paste down pictures of the coins that could be used.



Front

Back



UNIT 6 LESSON 8

Objective PS5

Solve simple word problems involving money to 99¢.

Vocabulary

Price, compare, lost, found

Materials

Coin facsimiles for each student
5 toys with price tags

12¢	19¢	27¢	45¢	63¢

Introducing the Lesson

Review the values of these coin combinations using counting by 5s and counting by 10s for most examples.

2 dimes	4 dimes	2 nickels	4 nickels
2 quarters	4 quarters	3 dimes	
1 nickel	2 dimes	1 nickel	1 quarter
1 nickel			

Review the comparison of two-digit numbers. Have the students choose the *smaller* number.

Introduce the following idea: to be able to buy something, the price must be the same or less than the amount of money you have. Determine which of the toys could be purchased for 2 dimes (i.e., the toy priced 12¢ or 19¢, but not the others). Determine which of the toys can be purchased for the other coin combinations shown above.

Teaching the Lesson

As a group, complete the following exercises.

Bill had (5)(5)(5)(5) . Bill had ___¢.
Bill found 5 cents. Now Bill has ___¢.

Jill had (10)(5)(5) . Jill had ___¢.
Jill lost 10 cents. Now Jill has ___¢.

Phil had (25)(10) . Phil had ___¢.
Phil lost 5 cents. Now Phil has ___¢.

Devise similar questions at the level of your students. (Note that in these questions, a single coin is lost or found, thus addition and subtraction are not required.)

Nome _____



Mary has (5)(5)(1). She has 30 ¢.
Which can she buy? or or

Harry has (25)(10)(10)(5). He has 20¢.
Which can he buy? or or

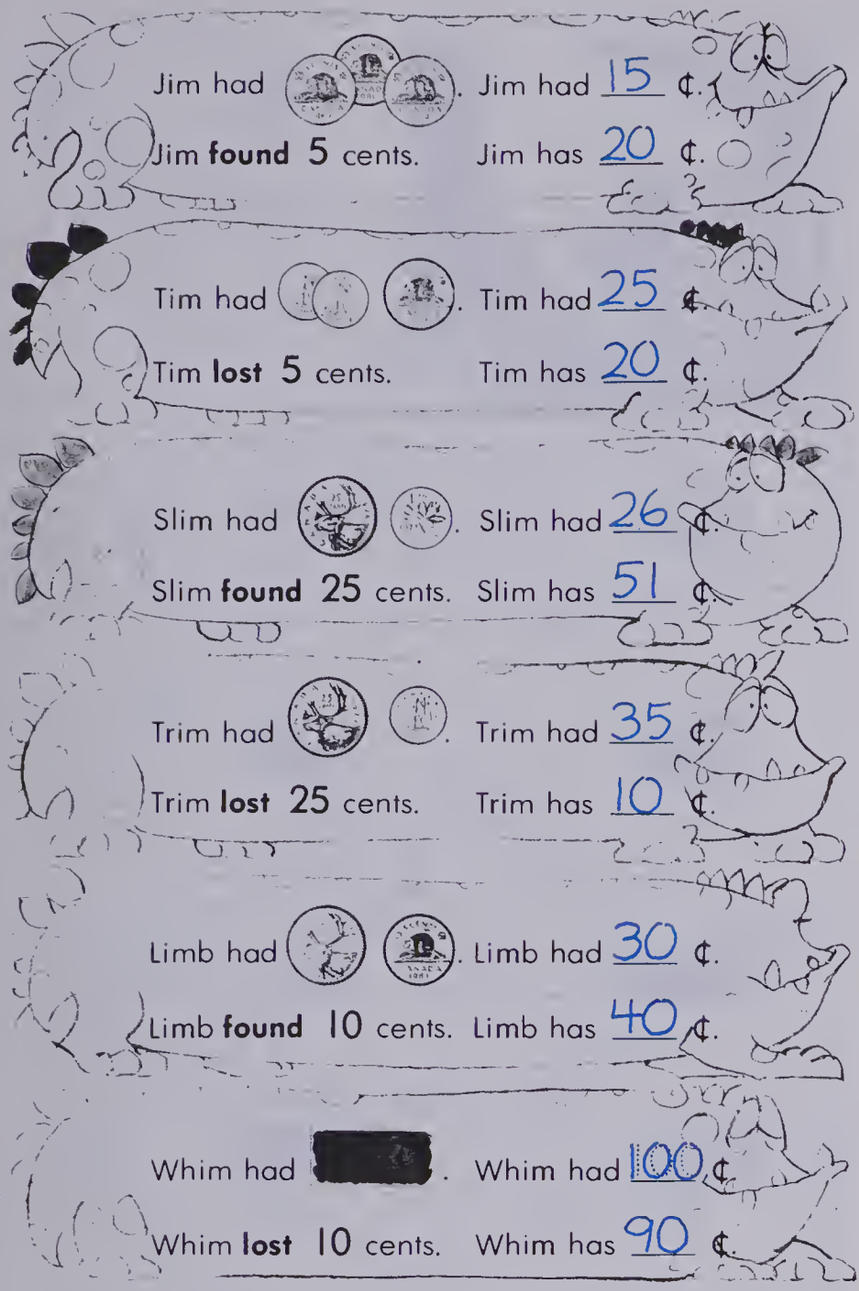
Gary has (50)(50). He has 50 ¢.
Which can he buy? or or

Terry has (25)(10). She has 15 ¢.
Which can she buy? or or

Money problems one hundred twenty-three 123

Using the Pages

- You may wish to assign workbook pages 123 and 124 on separate days.
- Page 123 involves determining and comparing values. Page 124 contains simple word problems which require the taking away or adding of a single coin.
- Please note that no more than two kinds of coins are found in any problem. Problems which involve three or more kinds of coins are delayed until Unit 11.



Extra Practice **Worksheet PS5**
Pages 123-124

Dan had . Dan had 20 ¢.
He found 5 cents. He now has 25 ¢.

Fran had . Fran had 35 ¢.
She lost 10 cents. She now has 25 ¢.

Van had . He had 35 ¢.
He found 10 cents. He now has 45 ¢.

Reinforcement

Set up a comparison activity involving coins. You will need a menu and an assortment of problem cards.

	Short's	Menu	
crackers	17¢	ice cream	43¢
donut	35¢	carrot stick	14¢
grapes	26¢	juice	47¢

What is the most expensive food you can buy with (10) (10) (5) ?

Front

crackers
25¢ > 17¢

Back

For your assistance, a list of coin combinations which use only one or two kinds of coins follows.

25¢, 10¢
25¢, 10¢, 10¢
25¢, 10¢, 10¢, 10¢
10¢, 5¢
10¢, 10¢
10¢, 5¢, 5¢
10¢, 10¢, 5¢
10¢, 10¢, 5¢, 5¢
10¢, 10¢, 10¢, 5¢
25¢, 5¢
25¢, 5¢, 5¢
25¢, 5¢, 5¢, 5¢
25¢, 5¢, 5¢, 5¢, 5¢
25¢, 5¢, 5¢, 5¢, 5¢, 5¢
25¢, 25¢
10¢, 10¢, 5¢, 5¢, 5¢
10¢, 10¢, 10¢, 5¢, 5¢

Enrichment

Each exercise on pages 123 and 124 is restricted to two kinds of coins. You may wish to relax this restriction for some students. Challenge these students to write several similar problems that use 3 or more kinds of coins. Have the students exchange and solve each other's problems.

Problem Solving Activities

Assign Level 2, Unit 6

UNIT 6 LESSON 9

Objective M4

Recognize and write amounts to $9.99 involving dollars, dimes, and pennies.

Vocabulary

Dollar bills, $__.__, dollars and cents

Direction words:
- Count with 1¢s.
- Which is less?

Materials

Facsimiles of dollars, dimes, and pennies
Vertical counting ladders

Introducing the Lesson

Day 1

Review the names and relationships of the penny, dime, and dollar.

- 1 dime = 10 pennies = 10¢
- 1 dollar = 100 pennies = 100¢
- 1 dollar = 10 dimes

Associate the penny with 1¢, the dime with 10¢, and the dollar with 100¢. Have the students use concrete materials to identify and make the amounts listed below. Treat this as a place-value activity that uses somewhat more abstract concrete materials than number blocks.

235¢ 126¢ 503¢ 370¢ 642¢

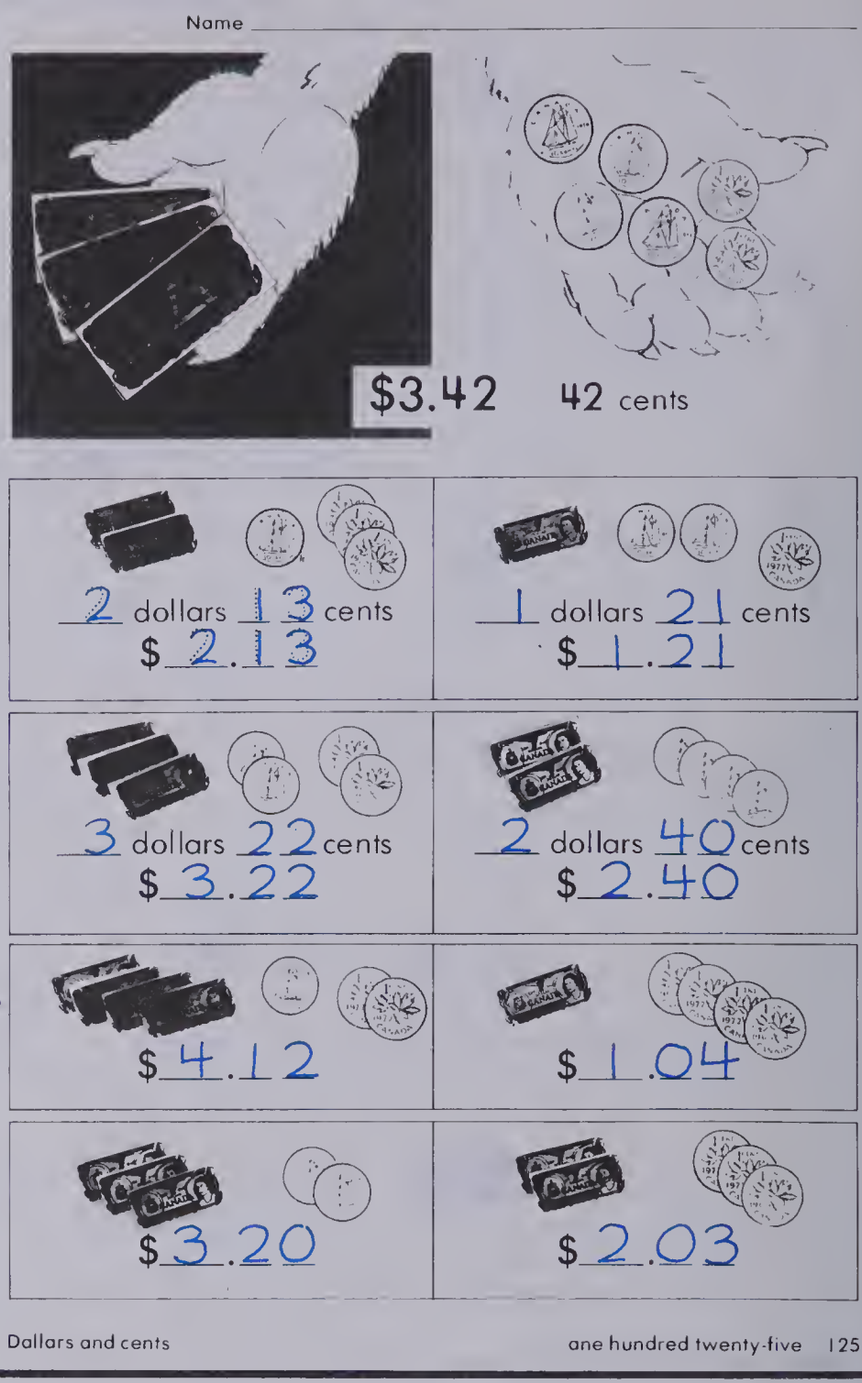
Using the same examples, separate the materials *and* the verbal description into dollars and cents, e.g., 2 dollars 35 cents. Be sure that students grasp this intermediate step, before you introduce the dollar sign.

Teaching the Lesson

Day 2

Use the dollar, dime, and penny to review and extend counting concepts. Record the results on vertical counting ladders. Focus on the trading aspects implicit in counting (e.g., in passing from $1.89 to $1.90 you need to trade 10 pennies for 1 dime). Relate counting with money to previous counting experiences.

Relate the comparison of money amounts to $9.99 to the comparison of numbers to 999.



Using the Pages

- You may wish to assign pages 125 and 126 on different days. Page 125 contains straightforward recording exercises which the students should find easy if the manipulation of materials and the recording of results have been part of the lesson instruction.
- Demonstrate how to translate to the usual form: 2 dollars and 35 cents becomes $2.35. Discuss the practical functions of the symbol $ (the sign for dollars) and the symbol . (the decimal point separates the dollars from the cents). Practise translating other amounts up to 9 dollars and 99 cents into the usual form. Avoid a decimal fraction discussion at this time.
- Page 126 involves counting and comparing. Manipulative materials should be available for the students' use. This is an excellent opportunity to determine which students have difficulties with counting and comparing 3-digit numbers.
- Encourage the students to cut out the nose-mask on page 126. (See the Enrichment.)

Count with ¢s.

$ 1.20	$ 2.25	$ 5.75	$ 1.95
$ 1.21	$ 2.26	$ 5.76	$ 1.96
$ 1.22	$ 2.27	$ 5.77	$ 1.97
$ 1.23	$ 2.28	$ 5.78	$ 1.98
$ 1.24	$ 2.29	$ 5.79	$ 1.99
$ 1.25	$ 2.30	$ 5.80	$ 2.00
$ 1.26	$ 2.31	$ 5.81	$ 2.01
$ 1.27	$ 2.32	$ 5.82	$ 2.02

Which is less?



$2.00 or $1.00	$4.50 or $3.80
$3.50 or $5.00	$3.20 or $3.09

Extra Practice

Worksheet M4
Pages 125-126

Which is more?

$3.00 or $4.00	$3.25 or $2.89	$4.30 or $4.60
$7.50 or $7.40	$5.19 or $5.91	$8.92 or $8.89
$3.46 or $1.88	$4.35 or $4.32	$3.09 or $7.06

Keep counting.

$1.67	$1.68	$1.69	$1.70	$1.71
$3.96	$3.97	$3.98	$3.99	$4.00

Reinforcement

Reproduce copies of the counting ladder worksheet for money found in the introduction to this unit. Have the students choose a money number for the start of each ladder. Alternatively, assign amounts either directly or via self-checking work cards.

Count by 10¢s.
$3.42 $4.12 $3.92

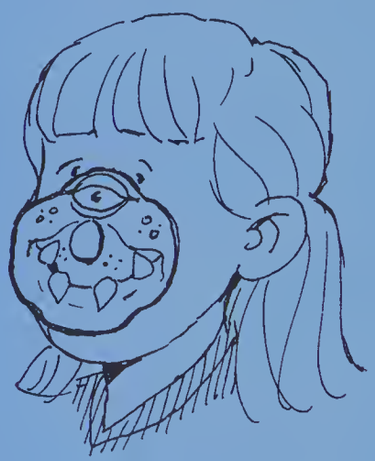
Front

The back of the card contains the answers.

As an extension of this activity, have the students count by 10s, using dimes as the representation for 10.

Enrichment

The illustration on page 126 is a *nose-mask* which fits most Grade 2 students' noses and senses of humour. Carefully cut out the mask and the nose hole. If a nose is firmly snuggled into the nose hole, friction should keep the mask in place. You may wish to cover the nose-mask with transparent adhesive plastic before cutting to ensure longer life of the mask.



UNIT 6 LESSON 10

Objective PS6

Locate amounts on a table and compare amounts to $9.99.

Vocabulary

Compare, dollars, cents, greater, less

Direction words:
- How much?
- Which costs more than ____?
- Which costs less than ____?
- Which costs most?
- Which costs least?

Materials

Monster table (See introduction to this unit.)

Introducing the Lesson

Reproduce the monster table shown in the introduction to this unit as a poster. Discuss how information is contained in the table. Note that the first row shows monster names and faces and the second row lists numbers of teeth. The number of teeth each monster has is located below its picture.

Review the comparison of numbers to 999 using the poster. Ask these questions:
- Who has the most teeth?
- Who has the fewest teeth?
- Who has more than 293 teeth?
- Who has less than 305 teeth?

Teaching the Lesson

Determine which is worth most: a dollar, a dime, or a penny.

Discuss the value of each place in the amount $3.33 (i.e., $3.33 is 3 dollars, $3.33 is 30¢ or 3 dimes, and $3.33 is 3¢ or 3 pennies).

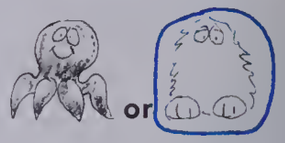
Have the students compare these amounts.

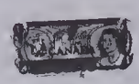
$3.52 and $4.00	$6.00 and $5.99
$7.12 and $6.05	$2.25 and $1.16
$1.25 and $1.19	$3.54 and $3.60
$5.42 and $5.52	$7.83 and $7.09
$6.37 and $6.32	$2.54 and $2.55

Review the vocabulary: most, least, more than, less than.

Name _____

Stuffed Monsters						
How much?	$3.80	$1.30	$4.30	$3.10	$1.50	$2.70

Which costs  ?  or

Which costs   ?  or 

Which cost **more than** $3.50?



Which cost **less than** $2.80?



Which costs **most**?



Which costs **least**?



Problem solving: reading tables

one hundred twenty-seven 127

Using the Pages

- Page 127 is an enrichment assignment which may not be suitable for all students. With appropriate, careful preparation this topic (which may be of great interest to your students) is within the understanding of many students in your class.

Name _____

What is the number?

3 hundred = 300

 = 234

h	t	o
6	3	2

= 632

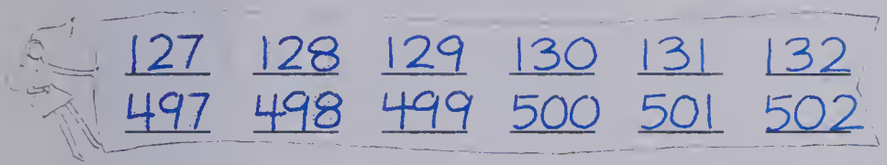
 = 305

Which is less?

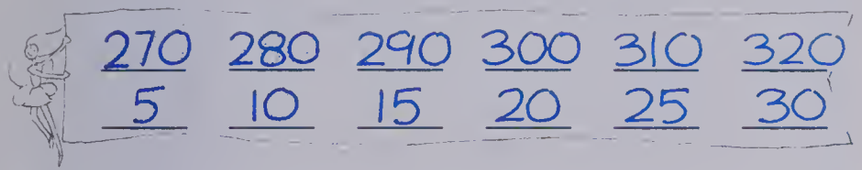
(352) or 421

(435) or 453

Keep counting.



127	128	129	130	131	132
497	498	499	500	501	502



270	280	290	300	310	320
5	10	15	20	25	30

Match these.



50¢ 25¢ 10¢

How much?



$1.23

Extra Practice **Worksheet PS6**

Monster toys					
How much?	$2.70	$1.50	$1.20	$4.30	$3.90

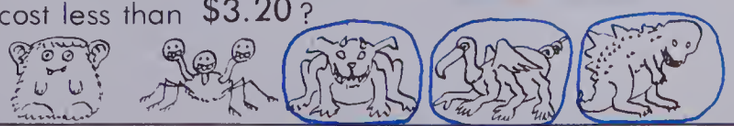
Which costs  ?  or 

Which costs  ?  or 

Which cost more than $2.90?



Which cost less than $3.20?



Reinforcement

These questions apply to the table on page 127. Have the students draw pictures of their answers.

Which monster costs  ?

Which monster costs  ?

Which monsters cost less than $2.05?
Which monsters cost more than $3.10?
Which monsters cost between $2.10 and $3.10?

Enrichment

If you have not already done so, establish a classroom store. The following items should be supplied:
dollar bills, quarters, dimes, nickels, pennies, toy cash register, sales tags, marking pens, items donated by students, classroom supplies, and other odds and ends.

UNIT 6 TEST

Part 1: Place value to three digits.

Part 2: Comparing numbers (less).

Part 3: Counting by ones, tens, and fives.

Part 4: Recognizing amounts of money in dollars and cents.

UNIT 7
Addition and Subtraction without Regrouping

Theme: Games

Lesson		Objective	Pages
1	A20	Use place-value skills in adding ones to tens and ones.	129-130
2	A21	Add tens and ones with no regrouping.	131-132
3	A22	Add two-digit numbers with no regrouping; add with money.	133-134
4	A23	Subtract ones from tens and ones, no regrouping.	135-136
5	A24	Subtract tens and ones, no regrouping.	137-138
6	A25	Subtract to find differences using tens and ones, no regrouping.	139-140
7	PS7	Add or subtract two-digit numbers in money problems, no regrouping.	141-142
8	A26	Add three-digit numbers, no regrouping.	143-144
9	A27	Subtract three-digit numbers, no regrouping.	145-146
10	GR3	Read pictographs.	147
Test		Addition and subtraction	148

Vocabulary

tens
ones
tens place
ones place
starting set
cross out
count back
difference
pictograph
hundreds

Printed Directions:

How many ____ ?
Add more ____ .
Help Sandy add the numbers.
Find the winners.
How many blocks in all?
Add the ones first.
How much in all?
Cross out.
Count back on the track to check your answer.
Subtract the ones first.
Subtract to find the difference.
Keep score.
Add the scores.
Start with the ones.
Which team scored the most points?
Remember to start with the ones.
How many points?

Materials

number line
place-value charts
place-value blocks: tens and ones
Numeral Cards: [1]... [99]
ten sticks or dimes
paper plates
coins: quarters, dimes, nickels, pennies
walk-on number line
cards, approximately 20 cm × 30 cm
chart paper
dice
4 bean bags (2 each of 2 different colours)
pins for bowling (plastic bottles or milk cartons)
ball (for bowling game)
marbles
string
small bags
strips of coloured paper
stiff paper or cardboard
loops of wool or string
chalk
masking tape
pencil and paper

About This Unit

Unit 7 deals with the addition and subtraction of two- and three-digit numbers where no regrouping (of tens and ones or of hundreds and tens) is required. The unit theme of *Games* is used to provide relevant and motivating contexts for developing and reinforcing the steps in these algorithms.

As prerequisites to this unit, students should be familiar with the following from previous units:

1. basic addition and subtraction facts to 9,
2. oral addition of a one-digit number to a two-digit number, using counting on,
3. place value of ones, tens, and hundreds,
4. lining up places for recording ones, tens, and hundreds,
5. adding 1 or 10 to a number,
6. subtracting 1 or 10 from a number.

Lesson activities focus on two major concerns: *what* we are trying to find out and *how* we can go about it.

Problem situations based on game scores provide opportunities for adding and subtracting two- and three-digit numbers. The students are asked to establish what is known and what they are trying to find out (such as: we know each team's score and we want to know the total score). A variety of methods is used to approach problems: estimation, the number line, concrete materials, counting methods, and ultimately, the algorithm for computing. Pupil pages then focus on the reinforcement of the algorithm by providing computation practice.

This unit establishes several ideas or habits that are essential to subsequent work, but which are not essential to this unit. For example, 36 + 2 can be worked out easily by counting, but in preparation for dealing with harder examples, the students are asked to line up the digits in computational form, add the ones, and then add the tens. Another obvious case involves establishing the habit of working from the ones, to the tens, to the hundreds, that is, from right to left. When no regrouping is involved, it is possible to get the correct answer using any order, as long as the places are aligned. However, in Unit 8 when regrouping is introduced, the order of working is very important. For this reason, the right-to-left pattern is established early and reinforced through each stage of the development of the algorithm.

Unit 7 relies heavily on the place-value ideas that have been developed in earlier units. If students have an adequate grasp of place value relating to ones, tens, and hundreds, they will avoid many of the trouble spots in computation skills. This is even truer of the regrouping skills introduced in Unit 10. If students have difficulty with a concept, more time should be spent developing that concept. For example, if students have difficulty with place-value alignment for addition or subtraction, go back to Units 3 and 6 and spend more time on the place-value ideas outlined there.

It is important to make use of the materials as outlined in the lessons for several reasons:

1. to relate earlier place-value work to new ideas;
2. to provide a concrete model for expressing abstract ideas, and a concrete reference for abstract vocabulary;
3. to aid visual and tactile-kinesthetic learning;
4. to make the illustrations on pupil pages more meaningful through association with previous experience;
5. to provide motivating activities;

6. to provide a reliable method to fall back on when symbolic work gets too abstract;
7. to provide a sound basis for extending the algorithms to regrouping.

Wherever possible, students should be provided with practical applications for adding and subtracting two- and three-digit numbers. Care must be taken in this unit, however, to ensure that the examples used do *not* involve regrouping. As a result, there may be an element of artificiality, as many activities specify the use of certain combinations to avoid regrouping. This is a necessary restriction at this point in the development of the algorithms. Unit 10 introduces regrouping; at that stage the restrictions are removed and any number combinations can be used.

Ideas

Several of the ideas used as part of the *Games* theme of Unit 7 should be prepared ahead of time. Many can be used throughout the unit, not just with one particular lesson. Some restriction on the numbers is necessary to ensure that no regrouping is required.

Add and Subtract Cards

Provide laminated cards, such as those shown below, a die, and erasable markers.

□□ + □ 48	□□ − □ 21	□□ +□□ 59	□□ −□□ 12

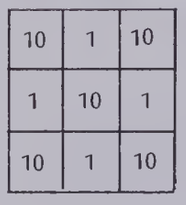
Two students each choose a card (provide cards that involve examples from completed lessons). Students take turns rolling the die and recording the number in one of the boxes. Not every roll can be used. The first student to complete an example correctly wins the game. Students will soon recognize which numbers are needed to complete their cards.

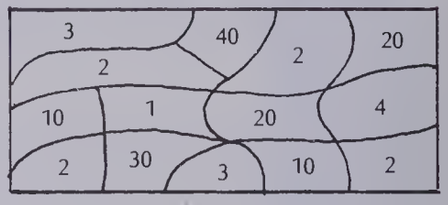
2□ +□6 57	(need a 1 and a 3)

Target Games (see pupil page 131)









Provide a target on fabric, chart paper, or taped on the floor; bean bags; and 1, 10, and 100 blocks. Students take turns tossing a specified number of bean bags onto a target (e.g., two bags each). At first the students should make concrete representations for each value they get and count up to find a total score.



10 + 10 + 20 = 40 in all

Later the students can add the numbers mentally or record their scores to find the total.

Hundred Square Hop (see pupil page 136)

Use a large, laminated hundred board and a die marked 1, 3, 5, 10, 10, 10. Give each player a marker.

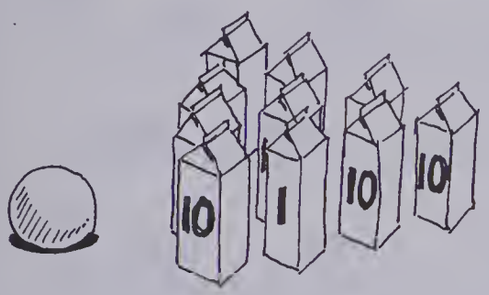
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Players take turns rolling the die and moving forward from 1 to 100 according to the score they get (counting on). The first player to reach 100 is the winner. Initially the students will count by ones, but before long patterns will become apparent (e.g., across for ones, down for tens).

For subtraction, start at 100 and count back.

Bowling (see pupil page 137)

Plastic bottles or milk cartons (for "pins") and a ball of appropriate size are needed. Mark each pin 10 or 1. Note the total value of the pins. Then set up the pins.



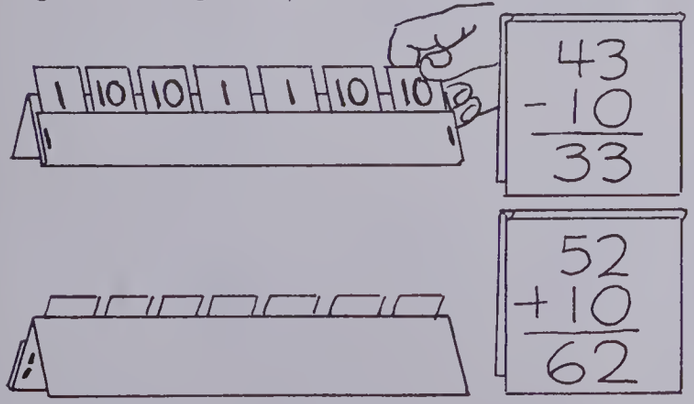
Each student rolls the ball a specified number of times and subtracts the value of the knocked-over pins to determine a score. Compare scores to establish the winners.

Go Fish

For this game, a set of 30 cards (15 of [10] and 15 of [1]), 4 card holders(these holders must be long enough for 8 cards), and paper and pencil are needed.



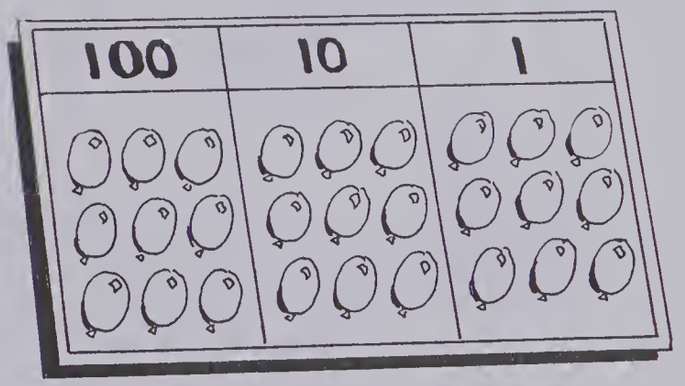
Students take turns drawing cards from the face-down pile, until they have seven cards in their holders. They then take turns choosing a card from the next player's holder and recording the change of score. As a card is taken, a subtraction example is recorded. As a card is added, an addition example is recorded. After each player has taken a card, and has had a card taken, final scores are compared. The highest or lowest score can win. At the end of each game, students should have recorded an addition and a subtraction example. Check these together.



At first, play the game orally, then play it recording as a group, and finally have pupils record on their own. Teacher direction is required to begin.

Balloon Popping (see pupil page 146)

Make a large chart marked as shown.



Students toss 10 pennies onto the chart to try to land on as many balloons as possible, and with as high a value as possible. Tally up the values of the balloons that are "popped" (landed on). Subtract this amount from 999 to find the final score of "unpopped" balloons. The lowest score wins, or the score closest to a predetermined number.

Domino Addition



$$\begin{array}{r} 54 \\ +31 \\ \hline 85 \end{array}$$

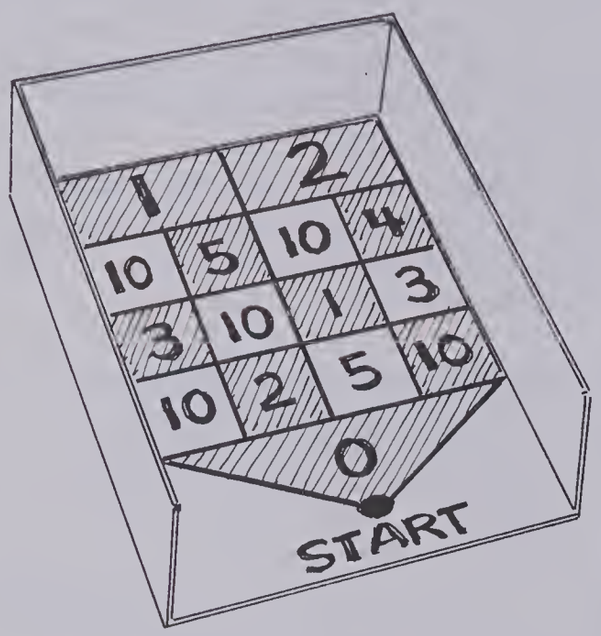
Place a set of dominoes face down on the table. Each player takes two dominoes, places them one under the other, and records two 2-digit numbers to match. The player then adds the two numbers.

If either the ones or tens adds to more than nine, the player reverses one of the dominoes. If either the ones or tens still adds to more than nine, the player loses the turn.

Specify ahead of time whether the highest or lowest score or the score closest to a given number wins.

Flick It

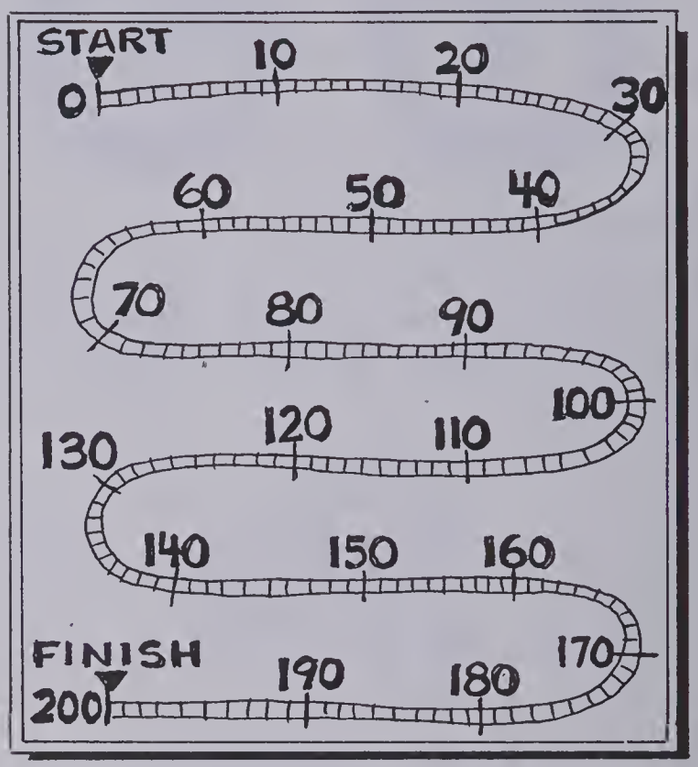
Make a box lid into a game board as shown. The lid is open at one end.



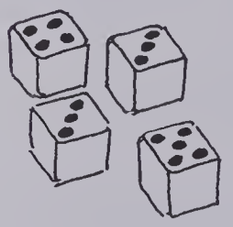
Each student flicks a marker, such as a poker chip, from the starting dot onto the board. Total the points for each section that the marker touches. The person with the highest score gets a point. Play several rounds. Compare points. Students can add mentally or use place-value counters at first. Later, scores can be recorded for adding.

Measure Maze

Make a game board with a path marked in centimetres. Number every tenth centimetre. Use 4 dice and a marker for each player.



A player rolls the 4 dice. The player places the two dice with the greatest numbers together and records a two-digit number. The player places the other two dice together and records another two-digit number. The numbers are subtracted to find the distance the player can move his or her marker.



5	4
3	3

2 1 is the player's move

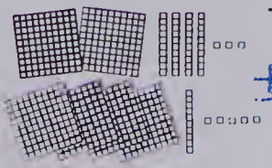
Players take turns. The first player to reach Finish wins.

Name _____

Pretest **Unit 7**

Add.

72 + 5 = 77	6 + 23 = 29	20 + 60 = 80	51 + 34 = 85
28 + 40 = 68	35 + 24 = 59	182 + 416 = 598	532 + 147 = 679



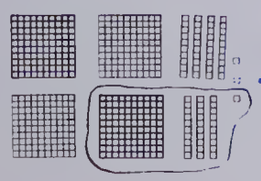
h	t	o
2	4	3
+ 4	1	5
6	5	8



tens	ones
3	2¢
+ 3	3¢
6	5¢

Subtract.

28 − 4 = 24	95 − 3 = 92	70 − 50 = 20	80 − 30 = 50
49 − 27 = 22	63 − 20 = 43	574 − 231 = 343	826 − 410 = 416



h	t	o
4	7	3
− 1	3	1
3	4	2



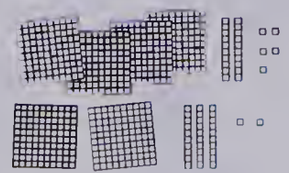
tens	ones
4	9¢
− 1	6¢
3	3¢

Name _____

Post-test **Unit 7**

Add.

24 + 3 = 27	6 + 41 = 47	30 + 50 = 80	52 + 16 = 68
38 + 41 = 79	73 + 26 = 99	364 + 514 = 878	423 + 160 = 583



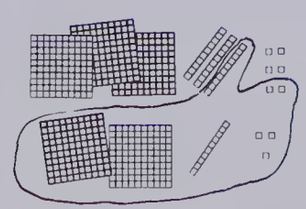
h	t	o
4	2	5
+ 2	3	2
6	5	7



tens	ones
5	5¢
+ 3	3¢
8	8¢

Subtract.

39 − 4 = 35	75 − 2 = 73	60 − 30 = 30	70 − 60 = 10
58 − 12 = 46	64 − 41 = 23	378 − 163 = 215	945 − 620 = 325



h	t	o
5	4	9
− 2	2	5
3	2	4



tens	ones
7	2¢
− 5	1¢
2	1¢

UNIT 7 LESSON 1

Objective A20

Use place-value skills in adding ones to tens and ones.

Vocabulary

Tens, ones, tens place, ones place

Direction words:
- How many tens and ones?
- Add more ones.
- Help Sandy add the numbers.

Materials

Number line
Place-value chart
Place-value blocks: tens and ones
Numeral Cards: 1 ... 99

Introducing the Lesson

As a review of Unit 1 work with adding one, practise oral addition of one, two, or three using counting on. Use a number line for reference. "Start with 57. Add one." *Fifty-eight.*

42 + 1	98 + 1	65 + 1	70 + 1
24 + 2	65 + 2	81 + 3	16 + 3 etc.

Count on softly to reach the answer.
16 + 3 → *sixteen ... seventeen ... eighteen ... NINETEEN*

Teaching the Lesson

Review the use of the place-value chart to record tens and ones. Hand a student a pile of mixed tens and ones and ask him or her to record how many on the chart.



tens	ones
2	4

Extend the above procedure. Record a two-digit numeral beside a model of tens and ones. Hand 3 more ones to the student. Ask him or her for the sum by counting on. Then ask where the numeral for the 3 ones should be recorded under the numeral 24. Record the numeral and add with the students.



tens	ones
2	4
+	3

UNIT 7 Name _____

How many tens and ones?



tens	ones
4	3



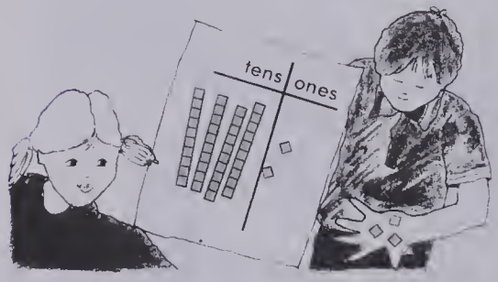
tens	ones
3	6



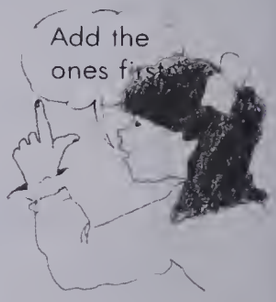
tens	ones
	4



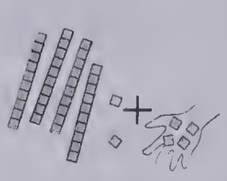
tens	ones
7	0



tens	ones
4	2
+	3
4	5



Add more ones.



tens	ones
4	2
+	4
4	6



tens	ones
6	3
+	2
6	5



tens	ones
3	2
+	3
3	5



tens	ones
3	3
+	6
3	9

Using the Pages

- The exercises on page 129 review the use of a place-value chart and the interpretation of place-value materials as a follow-up to lesson activities using these materials.
- The exercises on page 130 provide practice in addition. Encourage the students to add ones and record, then record the tens. Some students may require help with the bottom exercise.

Add.

tens	ones
4	3
+	2
4	5

tens	ones
2	5
+	4
2	9

tens	ones
	2
+ 6	5
6	7



67	8	40	73	2
+ 2	+ 21	+ 6	+ 5	+ 24
69	29	46	78	26
51	42	81	4	9
+ 6	+ 7	+ 7	+ 53	+ 30
57	49	88	57	39

Help Sandy add the numbers.

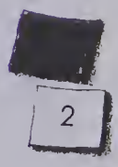


tens	ones
4	6
+	3
4	9



tens	ones
	5
+ 3	2
3	7

tens	ones
2	4
+	4
2	8



tens	ones
6	3
+	2
6	5

Extra Practice

Worksheet A20
Pages 129-130

Count on.

46 + 2 = 48	34 + 1 = 35	53 + 3 = 56
27 + 1 = 28	61 + 3 = 64	75 + 2 = 77
81 + 1 = 82	44 + 2 = 46	96 + 3 = 99

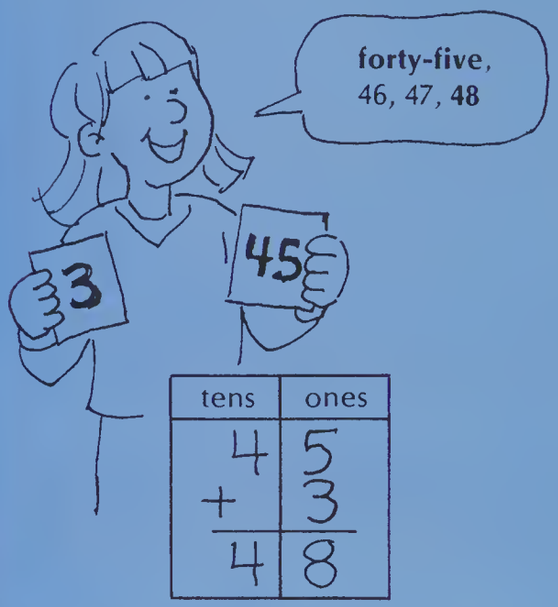
Reinforcement

Take the one- and two-digit Numeral Cards and make a pile of each. Give each student a chance to come up, take one card from each pile, count on to add the numbers, and then record the addition on a tens and ones chart.

Discuss whether it matters which way an addition is recorded:

$$\begin{array}{r} 45 \\ +\ 3 \\ \hline \end{array} \quad \text{or} \quad \begin{array}{r} 3 \\ +45 \\ \hline \end{array}$$

The sum will be the same, but we usually place the two-digit numeral on top.



tens	ones
4	5
+	3
4	8

Enrichment

Provide Numeral Cards 0 to 5. Turn them face down and mix them. Students take turns turning over three cards and arranging them in an addition pattern so that the sum is as close to 25 as possible. Compare sums.

$$\begin{array}{r} \square\square \\ +\ \square \\ \hline \end{array}$$

UNIT 7 LESSON 2

Objective A21

Add tens and ones with no regrouping.

Vocabulary

Direction words:

Add. Find the winners.
How many blocks in all?
Add the ones first.

Materials

Masking tape or chalk, ten sticks or dimes, two dice, four bean bags (2 each of 2 different colours), place-value chart, place-value blocks, paper plates

Introducing the Lesson

On a flat surface, such as a table or the floor, draw with chalk or use masking tape to show a large target marked 10 20 30 (40) 30 20 10. Choose two students. Give each two bean bags of the same colour. Each student tosses the bean bags onto the target and calls out the scores. Record each person's scores on the chalkboard and add them with the students to determine the winner. Show how to line up the tens and ones. Add and record the ones first (zero), then add and record the tens. Repeat with new players. Later, read the scores, using the term *tens*, e.g., "Four tens and three tens is seven tens in all."

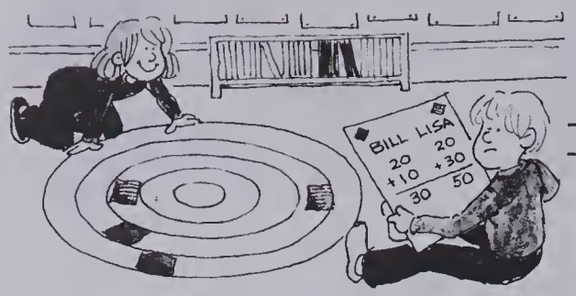
Teaching the Lesson

Use a place-value chart and place-value blocks to build a model of 34 and 52. Ask a student to come up and add the ones by pushing the four blocks and the two blocks together, and then record six ones. Ask another student to add and record the tens. Repeat, having students record how many blocks are on the chart (avoid regrouping at this stage), adding and recording ones, then adding and recording tens.

tens	ones
///	····
/////	··

tens	ones
3	4
+5	2

Name _____



2 tens + 3 tens = 5 tens

tens	ones
2	0
+3	0
5	0

20 + 30 = 50

Add. Find the winners.

tens	ones	tens	ones	tens	ones	tens	ones	tens	ones	tens	ones
2	0	1	0	3	0	5	0	4	0	3	0
+ 2	0	+ 5	0	+ 4	0	+ 1	0	+ 5	0	+ 2	0
4	0	6	0	7	0	6	0	9	0	5	0

tens	ones	tens	ones	tens	ones	tens	ones	tens	ones	tens	ones
1	0	3	0	4	0	3	0	5	0	4	0
+ 4	0	+ 1	0	+ 2	0	+ 5	0	+ 2	0	+ 4	0
5	0	4	0	6	0	8	0	7	0	8	0

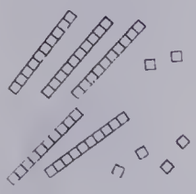
Add.

tens	ones	tens	ones	tens	ones	tens	ones	tens	ones
2	0	2	0	4	0	3	0	5	0
+ 3	0	+ 2	0	+ 5	0	+ 2	0	+ 2	0
5	0	4	0	9	0	5	0	7	0

Using the Pages

- The exercises on page 131 use place-value charts to help the students add multiples of ten.
- The first exercise on page 132 provides practice in interpreting place-value materials and recording addition. Practice in addition is provided in the bottom exercise.

How many blocks in all? Add the ones first.



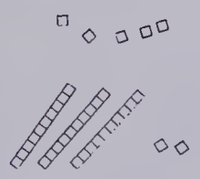
tens	ones
3	2
+ 2	4
5	6



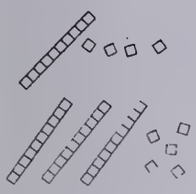
tens	ones
5	3
+ 3	1
8	4



tens	ones
1	4
+ 4	5
5	9



tens	ones
	5
+ 3	2
3	7



tens	ones
1	4
+ 3	5
4	9



tens	ones
4	0
+ 2	5
6	5

Add.

tens	ones
7	1
+ 1	5
8	6

tens	ones
3	2
+ 2	4
5	6

tens	ones
6	3
+ 2	4
8	7

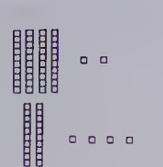
tens	ones
5	0
+ 2	6
7	6

tens	ones
3	3
+ 6	6
9	9

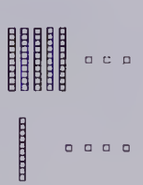
54	35	20	81	42
+ 22	+ 13	+ 47	+ 12	+ 30
76	48	67	93	72

Extra Practice **Worksheet A21**
Pages 131-132

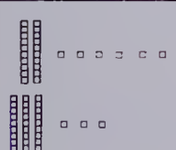
How many blocks in all? Add the ones first.



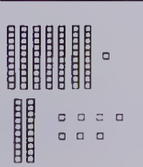
tens	ones
4	2
+ 2	4
6	6



tens	ones
5	3
+ 1	4
6	7



tens	ones
2	6
+ 3	3
5	9



tens	ones
7	1
+ 2	7
9	8

Reinforcement

1. Use ten sticks or dimes and 2 dice. Give each student a chance to roll the dice, take those numbers of tens, add them, and say how many tens in all. Record these numbers for the students. Later the students can record their own numbers.



4 tens and 2 tens is 6 tens in all.

40
+20
60

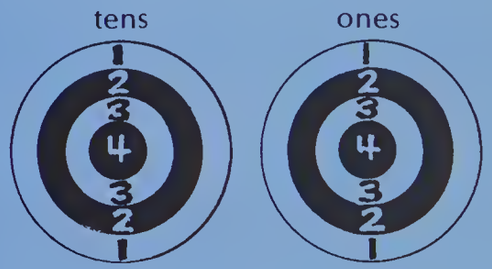
2. Provide paper plates with an assortment of ones and tens blocks on each one. Students choose two paper plates, record how many on each plate, and then add to find the sum.



	tens	ones
A	3	2
B	+4	1
A + B =	7	3

3. Change the target game so that there is one target for tens and another for ones. Have two students each throw a bean bag at each target. Record each student's score.

Have the students add ones, then tens. Other pairs of students can try to beat the score of the first pair.



4. Provide the bean bag game for small groups of students to play independently.

Enrichment

Provide Numeral Cards [1] to [5]. What different arrangements of cards, in the $\frac{\square\square}{+\square\square}$ format, give a sum between 50 and 60?

21	24	15
+35	+31	+43

UNIT 7 LESSON 3

Objective A22

Add two-digit numbers with no regrouping; add with money.

Vocabulary

Direction words:

How many does she have now?
How much in all?

Materials

Number line
Coins: quarters, dimes, nickels, pennies
Paper plates

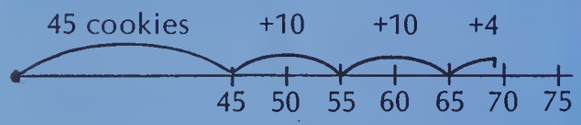
Introducing the Lesson

Review the addition facts for doubles (4 + 4), doubles plus one (4 + 5), and other sums to nine, as a check for recall of these facts. If students can recall these sums in isolation, encourage them to use recall rather than counting for two-digit addition examples. This transfer does not always occur without encouragement.

Teaching the Lesson

Use imaginary story problems to practise estimating sums. Use the number line for reference. For example:

"If I had 45 chocolate chip cookies and 24 oatmeal cookies, about how many cookies would I have in all? 40? 50? 100? 60? 70? Let's check on the number line."



"Let's add to check. Who can record the example?"

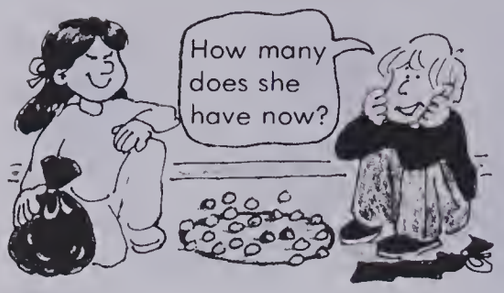
$$\begin{array}{r} 45 \\ +24 \\ \hline 69 \end{array}$$

Review values for a penny, a nickel, a dime, and a quarter. Practise finding the values of sets of coins. Give each student a chance to sort and count a handful of coins, and then record how many cents in all.



25 35 45 46 47 ⟶ 47¢

Name _____



tens	ones
4	5
+ 2	3
6	8



Add.

21 + 14 = 35	34 + 15 = 49	27 + 51 = 78	46 + 22 = 68	24 + 73 = 97
41 + 30 = 71	52 + 27 = 79	23 + 46 = 69	42 + 42 = 84	65 + 11 = 76
20 + 38 = 58	61 + 25 = 86	43 + 16 = 59	98 + 1 = 99	40 + 35 = 75
21 + 24 = 45	6 + 32 = 38	45 + 13 = 58	39 + 20 = 59	52 + 6 = 58
32 + 13 = 45	27 + 12 = 39	35 + 33 = 68	41 + 56 = 97	75 + 12 = 87

Two-place addition one hundred thirty-three 133

Using the Pages

- The examples on page 133 provide practice with addition of tens and ones.
- On page 134, the students are required to count up the values of two sets of coins and to add to find the total. You may want to do the left column with them and assign the right column as independent work.

penny nickel dime quarter



1¢ 5¢ 10¢ 25¢

How much in all?



$$\begin{array}{r} 23¢ \\ +\ 15¢ \\ \hline 38¢ \end{array}$$



$$\begin{array}{r} 40¢ \\ +\ 25¢ \\ \hline 65¢ \end{array}$$



$$\begin{array}{r} 35¢ \\ +\ 51¢ \\ \hline 86¢ \end{array}$$



$$\begin{array}{r} 27¢ \\ +\ 21¢ \\ \hline 48¢ \end{array}$$



$$\begin{array}{r} 14¢ \\ +20¢ \\ \hline 34¢ \end{array}$$



$$\begin{array}{r} 30¢ \\ +21¢ \\ \hline 51¢ \end{array}$$



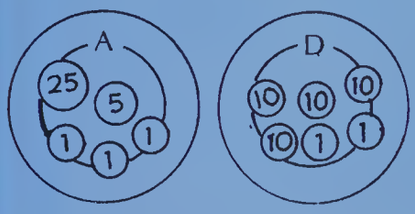
$$\begin{array}{r} 20¢ \\ +32¢ \\ \hline 52¢ \end{array}$$



$$\begin{array}{r} 35¢ \\ +\ 12¢ \\ \hline 47¢ \end{array}$$

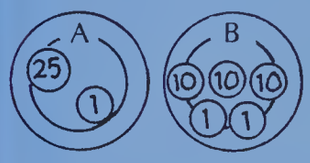
Reinforcement

1. Set out several plates of coins. (Make each set with up to four tens and four ones in all, so that no regrouping is required.) Ask two students each to pick a plate and count up the value. Have them record for addition and add to find how much in all. Have other pairs of students try to choose plates to get a higher (or lower) sum. Remind the students to add the ones column first, then the tens.

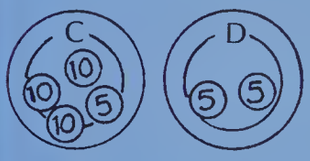


$$\begin{array}{r} A + D \\ 33¢ \\ +42¢ \\ \hline 75¢ \end{array}$$

2. Provide pairs of plates with coins for recording values and adding.



	tens	ones
A		
B	+	
A + B		



	tens	ones
C		
D	+	
C + D		

Enrichment

Give the students a money number such as 67¢. Ask them to think of two piles of coins that amount to that sum. Have them record the values and add. For example, students might represent 67¢.

$$\begin{array}{r} 37¢ \\ +30¢ \\ \hline 67¢ \end{array} \qquad \begin{array}{r} 50¢ \\ +17¢ \\ \hline 67¢ \end{array}$$

Give them other sums such as 79¢, 84¢, 63¢, and 56¢.

Extra Practice **Worksheet A 22**
Pages 133-134

How much in all?



$$\begin{array}{r} 25¢ \\ +\ 13¢ \\ \hline 38¢ \end{array}$$



$$\begin{array}{r} 31¢ \\ +\ 32¢ \\ \hline 63¢ \end{array}$$



$$\begin{array}{r} 45¢ \\ +\ 11¢ \\ \hline 56¢ \end{array}$$



$$\begin{array}{r} 40¢ \\ +\ 17¢ \\ \hline 57¢ \end{array}$$

UNIT 7 LESSON 4

Objective A23

Subtract ones from tens and ones, no regrouping.

Vocabulary

Starting set, tens, ones, count back, cross out

Direction words:

Cross out.

Count back on the track to check your answer.

Materials

Place-value blocks

Place-value charts

Introducing the Lesson

Use patterns to establish the idea of a starting set from which a subset is subtracted, and to review the cross-out method of identifying that subset.

Put out eight blocks and record:



8
−4
—

Ask a student to separate the subset and record the remaining number of blocks. Put out 18 blocks and record:

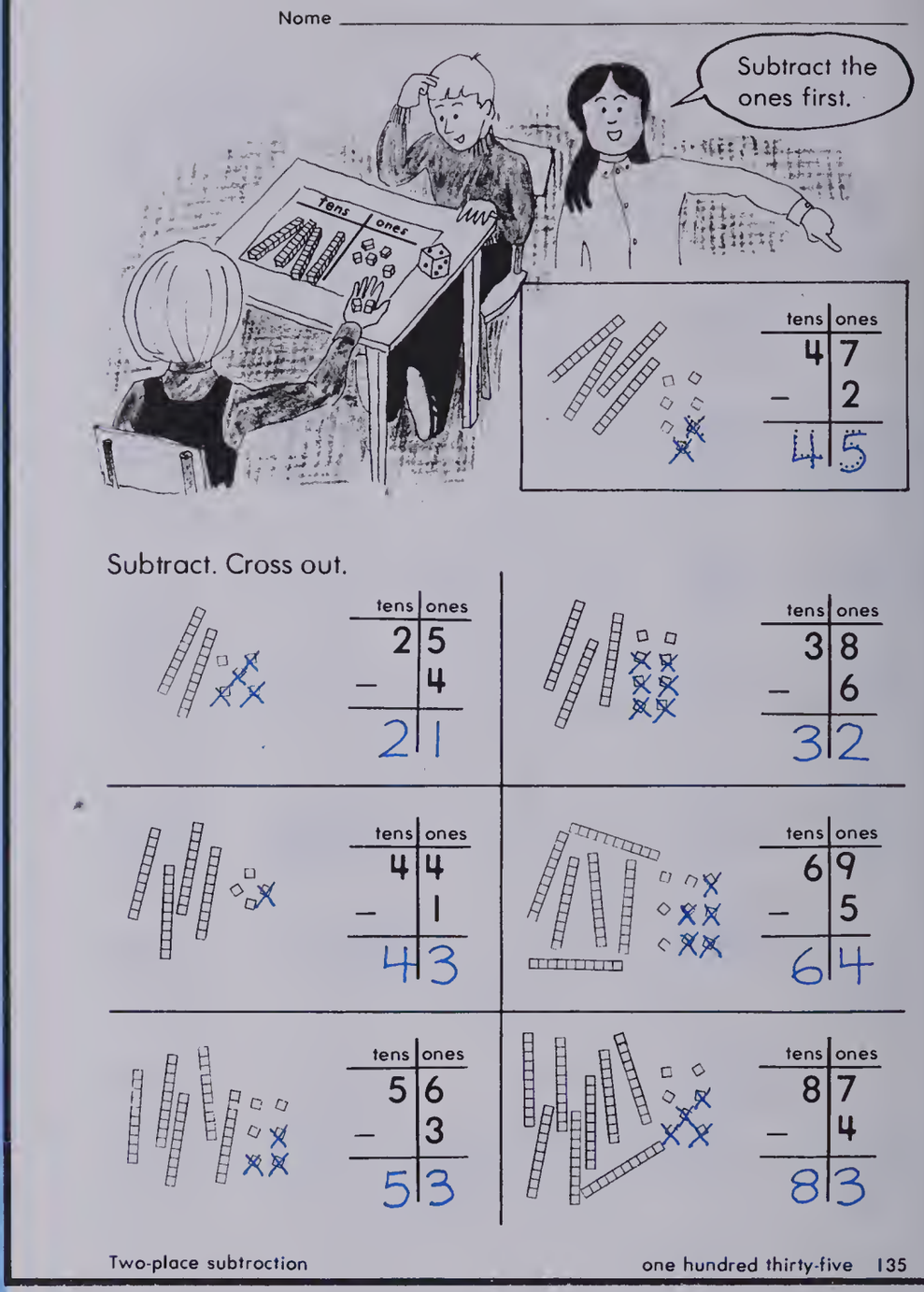


18
−4
—

Repeat the procedure with 28, 38, and 48.

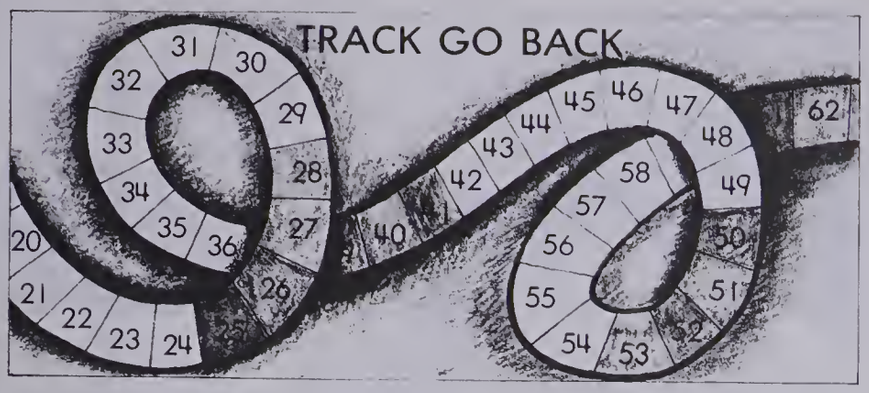
Teaching the Lesson

Record 46 − 2 = ___. Ask the students to count back to get the answer. Ask a student to come up and record the example on a place-value chart. Ask another student to subtract; the ones first, then the tens. Repeat with other examples. It is important for the students to realize that there are many ways to subtract, but that they are now beginning to learn a useful new method that they will use with harder and harder examples, and that the new method of dealing with ones, then tens will provide the same answer as their trusty old methods, such as counting back.



Using the Pages

- On page 135, students use the cross-out method to subtract ones from the starting set and record how many ones are left. They then look at the tens: since no tens are being subtracted, the starting number of tens will remain.
- On page 136, students use their new method of subtracting ones, then tens, and then check their answers by counting back on the number line (as in the lesson).



Subtract. Count back on the track to check your answer.

tens	ones
4	6
−	3
4	3

Start on 46. Go back 3. Did you land on 43?

tens	ones
4	8
−	2
4	6

tens	ones
6	2
−	1
6	1

tens	ones
5	7
−	5
5	2

tens	ones
2	8
−	4
2	4

tens	ones
3	5
−	4
3	1

tens	ones
5	4
−	2
5	2

tens	ones
2	9
−	7
2	2

tens	ones
3	8
−	5
3	3

36 − 3 = 33	37 − 6 = 31	25 − 5 = 20	43 − 2 = 41	39 − 8 = 31
36 − 4 = 32	59 − 5 = 54	27 − 4 = 23	45 − 4 = 41	36 − 5 = 31

Extra Practice **Worksheet A23**
Pages 135-136

Subtract. Use tens and ones blocks to check your answer.

45 − 2 = 43	36 − 4 = 32	78 − 7 = 71	26 − 5 = 21	54 − 4 = 50
59 − 5 = 54	48 − 3 = 45	37 − 6 = 31	29 − 8 = 21	66 − 2 = 64

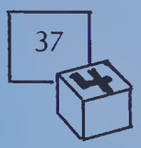
Reinforcement

1. Put several examples on the chalkboard, for example:

36	27	59	84	65
− 3	− 4	− 2	− 3	− 5

Use a walk-on number line. Ask a student to come up, complete an example by subtracting ones, then tens, and then use the number line to check the subtraction. (For 36 – 3 the student starts at 36 and subtracts or goes back 3 steps to 33.)

2. Provide cards marked 26 27 28 29 36 37 38 39 46 47 48 49 56 57 58 59. Use a regular die. Students choose a card, roll the die, and call out that subtraction example for others to record and answer.



37
− 4
33

Enrichment

Have the students do the following puzzles.

Add across.
Subtract down.

40	7	
20	3	

44	35	
3	2	

56	23	
21	2	

UNIT 7 LESSON 5

Objective A24

Subtract tens and ones, no regrouping.

Materials

Pins for bowling (You can use plastic bottles or milk cartons.)
Ball of appropriate size
Coins
Paper plates
Place-value charts
Pencil and paper

Introducing the Lesson

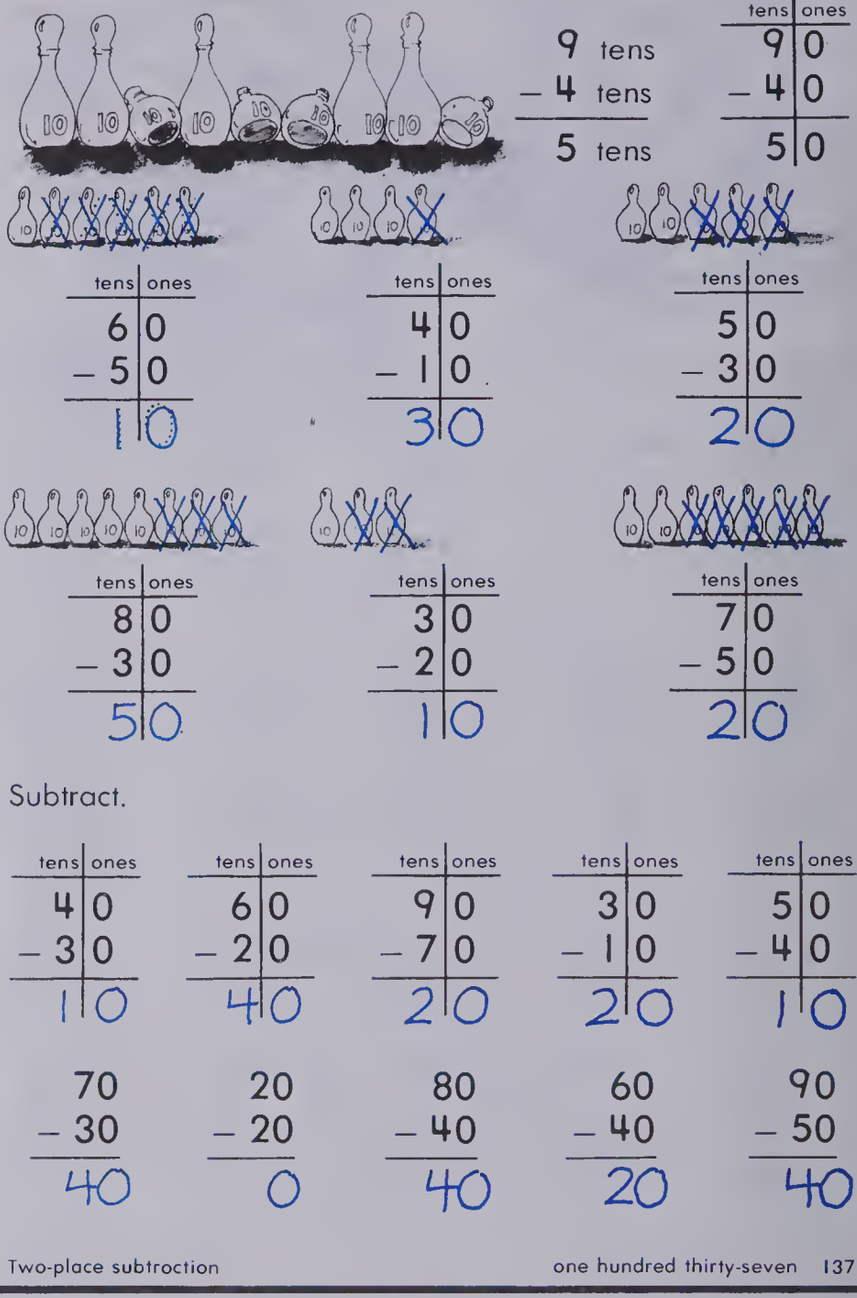
Play a bowling game with pins worth 10 points each. Set up some pins and record the total value (six pins → record 60). Give a player one roll of the ball to knock down as many pins as possible (give more than one roll, if necessary, depending on the size of the ball, etc.). Subtract the score of fallen pins to determine the player's score.

Vary the size of starting sets. Repeat. Gradually let students record to find their own scores. Subtract ones first, then tens, saying, "Five tens minus three tens equals two tens, or twenty."

Teaching the Lesson

Use coins and a paper plate. Hand a student some coins (up to 99¢). Ask the student to count the coins, put them on the plate, and tell you how much is there. From a set of pictures or objects with prices (so that no regrouping will be required), ask what the student wants to buy. The student pays you the price of the object and is left with change. Record the starting value of the coins, record the cost of the item, subtract, and show that the change or remainder is the same as what the student has. Encourage the students to see the idea of the whole amount being separated into the price of the object and the money left over. Repeat with several examples.

Repeat the above procedure using dimes, pennies, and a place-value chart.



Name _____

9 tens − 4 tens = 5 tens

tens	ones
9	0
− 4	0
5	0

tens	ones
6	0
− 5	0
1	0

tens	ones
4	0
− 1	0
3	0

tens	ones
5	0
− 3	0
2	0

tens	ones
8	0
− 3	0
5	0

tens	ones
3	0
− 2	0
1	0

tens	ones
7	0
− 5	0
2	0

Subtract.

tens	ones
4	0
− 3	0
1	0

tens	ones
6	0
− 2	0
4	0

tens	ones
9	0
− 7	0
2	0

tens	ones
3	0
− 1	0
2	0

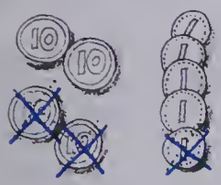
tens	ones
5	0
− 4	0
1	0

70	20	80	60	90
− 30	− 20	− 40	− 40	− 50
40	0	40	20	40

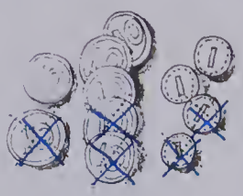
Using the Pages

- On page 137, students cross out pins as indicated in each example, and then subtract ones, then tens.
- On page 138, students cross out coins as indicated, and then subtract ones, then tens.

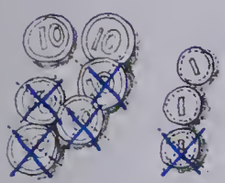




tens	ones
4	5
− 2	1
2	4



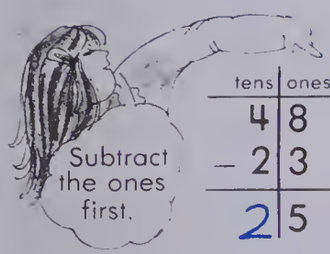
tens	ones
7	4
− 3	2
4	2



tens	ones
6	3
− 4	1
2	2



tens	ones
2	5
− 1	2
1	3



tens	ones
4	8
− 2	3
2	5

tens	ones
6	4
− 3	1
3	3

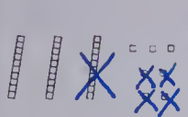
tens	ones
5	8
− 4	7
1	1

tens	ones
8	9
− 2	4
6	5

36	56	47	99	84
− 14	− 21	− 36	− 33	− 42
22	35	11	66	42

Extra Practice **Worksheet A24**
Pages 137-138

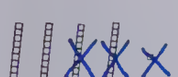
Subtract. Cross out to check your answer.



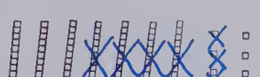
37
− 14
23



55
− 32
23



41
− 21
20



76
− 43
33

Reinforcement

1. Provide pencil and paper (or chalk and board). Give oral examples for the students to record and subtract. "You have 55¢. You pay 20¢ for juice. How much do you have left?"

55¢
−20¢
35¢

2. Practise estimating costs. Check using subtraction. "You have 75¢. You spend 50¢. About how much do you have left? 50¢? 10¢? 25¢? Let's check."

75¢
−50¢

3. Give pairs of students pencil and paper for playing the bowling game independently, recording scores, and trying for the lowest score after 3 turns. Start with 7 pins up each time.

Enrichment

Ask the students to record each subtraction and write the answer on the chart.

Have	Spend	Left
75¢	23¢	52¢
50¢	20¢	
85¢	24¢	
69¢	37¢	
48¢	32¢	

75
−23
52

UNIT 7 LESSON 6

Objective A25

Subtract to find differences using tens and ones, no regrouping.

Vocabulary

Difference

Direction words:

Subtract to find the difference.

Materials

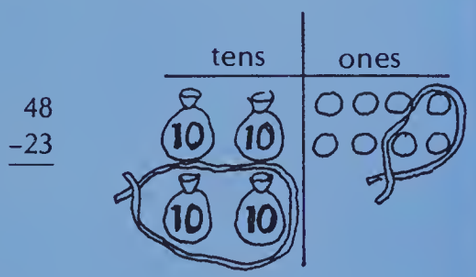
Marbles
String
Small bags

Introducing the Lesson

Use flash cards to review subtraction facts with minuends to nine. Encourage the students to think of the related addition facts for the ones they don't recall immediately. Encourage them to use recall where possible in two-digit examples, rather than counting.

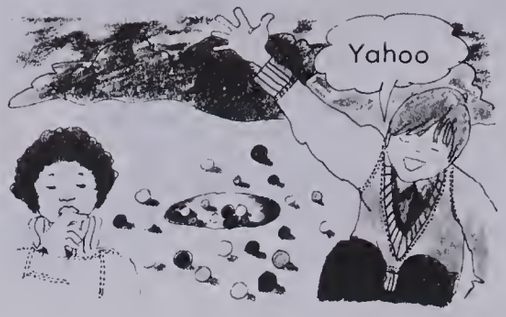
Teaching the Lesson

Use a marbles game as a theme. Give imaginary numbers to students for how many marbles a player has to start with, how many marbles are lost to another player, and how many are left. If a concrete model is required, use individual marbles for ones and bags of ten marbles for tens. Use loops of string or wool to loop off the lost marbles. Deal with ones, then tens.

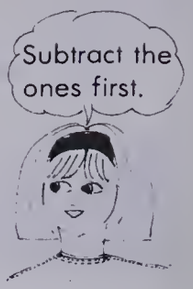


Explain to the students that subtraction also can be used to find the difference between two numbers, two scores, two ages, etc. When comparisons are made, nothing is taken away as in previous examples. The greater number is simply compared to the lesser, by subtracting the lesser to find the difference.

Name _____



tens	ones
6	8
− 2	3
4	5



Subtract.

97 − 24 = 73	78 − 51 = 27	35 − 14 = 21	84 − 42 = 42	71 − 30 = 41
68 − 22 = 46	49 − 15 = 34	76 − 11 = 65	69 − 46 = 23	79 − 27 = 52
34 − 12 = 22	28 − 6 = 22	47 − 23 = 24	75 − 35 = 40	68 − 43 = 25
25 − 4 = 21	88 − 66 = 22	79 − 22 = 57	95 − 63 = 32	37 − 26 = 11
49 − 46 = 3	54 − 20 = 34	38 − 13 = 25	61 − 21 = 40	34 − 30 = 4

Two-ploce subtroction

one hundred thirty-nine 139

Using the Pages

- On page 139, students subtract to find how many marbles are left in each example.
- On page 140, students subtract to find the difference between the two scores by choosing the greater number, recording it on top, and subtracting the lesser from it.



tens	ones
8	4
− 3	2
5	2



tens	ones
6	5
− 2	3
4	2



tens	ones
4	9
− 1	6
3	3

Subtract to find the **difference**.

24 58

tens	ones
5	8
−2	4
3	4

36 14

tens	ones
3	6
− 1	4
2	2

53 89

tens	ones
8	9
−5	3
3	6

21 54

tens	ones
5	4
−2	1
3	3

38 22

$$\begin{array}{r} 38 \\ -\ 22 \\ \hline 16 \end{array}$$

64 30

$$\begin{array}{r} 64 \\ -\ 30 \\ \hline 34 \end{array}$$

45 67

$$\begin{array}{r} 67 \\ -\ 45 \\ \hline 22 \end{array}$$

28 59

$$\begin{array}{r} 59 \\ -\ 28 \\ \hline 31 \end{array}$$

15 27

$$\begin{array}{r} 27 \\ -\ 15 \\ \hline 12 \end{array}$$

32 93

$$\begin{array}{r} 93 \\ -\ 32 \\ \hline 61 \end{array}$$

46 86

$$\begin{array}{r} 86 \\ -\ 46 \\ \hline 40 \end{array}$$

38 24

$$\begin{array}{r} 38 \\ -\ 24 \\ \hline 14 \end{array}$$

Extra Practice **Worksheet A25**

Pages 139-140

Subtract to find the difference.

25 67

$$\begin{array}{r} 67 \\ -\ 25 \\ \hline 42 \end{array}$$

46 31

$$\begin{array}{r} 46 \\ -\ 31 \\ \hline 15 \end{array}$$

94 62

$$\begin{array}{r} 94 \\ -\ 62 \\ \hline 32 \end{array}$$

28 39

$$\begin{array}{r} 39 \\ -\ 28 \\ \hline 11 \end{array}$$

58 35

$$\begin{array}{r} 58 \\ -\ 35 \\ \hline 23 \end{array}$$

65 41

$$\begin{array}{r} 65 \\ -\ 41 \\ \hline 24 \end{array}$$

43 87

$$\begin{array}{r} 87 \\ -\ 43 \\ \hline 44 \end{array}$$

79 35

$$\begin{array}{r} 79 \\ -\ 35 \\ \hline 44 \end{array}$$

Reinforcement

1. Use a number line and dice to make comparisons of scores using two-digit numbers. One player rolls the dice, makes a two-digit number with the faces, and records it. The other player does the same. Locate both scores on the number line. Ask, "Whose score is higher? How much higher?" Use subtraction to check. Gradually rely only on subtraction to find the differences.

2. Ask the students to find the difference between pairs of scores, for example:

Lions	48	Jets	24	Rams	59
Cubs	32	Chargers	67	Gnus	27

Use the names of school or class teams if possible.

Enrichment

Ask the students to list pairs of numbers having a difference of 5, e.g., 25 and 20, 47 and 42. Time the activity. Try other differences.

UNIT 7 LESSON 7

Objective PS7

Add or subtract two-digit numbers in money problems, no regrouping.

Materials

Cards (20 cm × 30 cm approximately), one per child
Coins: dimes and pennies (nickels and quarters optional)

Introducing the Lesson

Prepare a Healthy Food Store for classroom use. After a discussion of balanced lunches, give each student a piece of card and a lunch food or drink to draw and label. Have each student make a price tag for the food or drink. (Make prices with no more than 3 tens and 4 ones so that no regrouping will be required.) Display the cards on a large wall menu.

Teaching the Lesson

Use the wall menu. Give students a chance to come up, choose two items, record the costs, and add to find the total cost of their choices. Remind the students to record the cents signs and to add ones first, then tens. Each student should keep a "bill" with the costs and the total on it. Set up a cashier at the front of the class. Tell the students that they each have 79¢ to pay for their choices. Use the "bills". Show the students how to determine what amount of change they should get from the cashier. Have them determine their change on the back of their "bills". Select students to come up to you to pay. Record their charges and subtract to determine the change. Compare with the work on the back of their bills. After several examples, choose students to be cashiers and check the other bills.

Use coins. Do several examples in which students have at least 79¢. The students pay for their choices and record the subtraction to show their remaining money.



apple	25¢	79¢
crackers	+32¢	−57¢
	57¢	22¢

Name _____

HEALTHY FOOD STORE

Sandwiches		Drinks		Dessert	
Ham	35¢	Milk	14¢	Apple	15¢
Egg	22¢	Orange Juice	12¢	Orange	14¢
Tomato	26¢	Lemonade	10¢	Peach	13¢
Chicken	40¢	Milkshake	25¢	Yogurt	12¢
Cheese	33¢			Carrot Cake	14¢

How much in all?



35¢ + 14¢ = 49¢

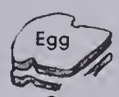


33¢ + 15¢ = 48¢

Milkshake 25¢
Carrot Cake + 14¢ = 39¢



26¢ + 10¢ = 36¢



22¢ + 14¢ = 36¢



40¢ + 14¢ = 54¢



22¢ + 25¢ = 47¢



33¢ + 10¢ = 43¢

Yogurt 12¢
Peoch +13¢ = 25¢



35¢ + 12¢ = 47¢



33¢ + 14¢ = 47¢

Answers may vary.

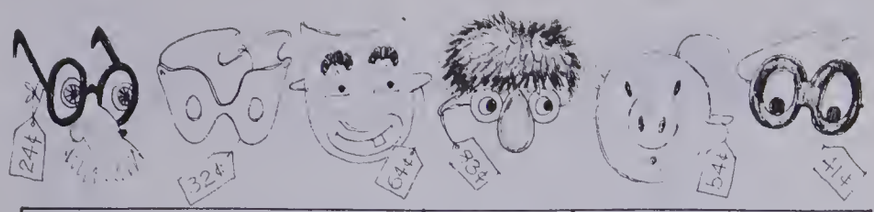


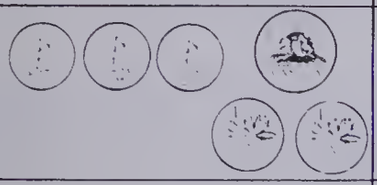
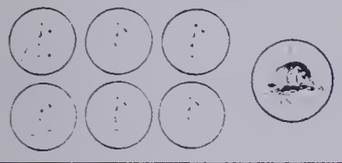
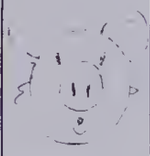
35¢ + 12¢ = 47¢

Problem solving one hundred forty-one 141

Using the Pages

- On page 141 the students are asked to find totals for the first two rows, and then find prices and totals for the last two rows. Do an example of each type with the class.
- Depending on the ability of your class, you may want to do page 142 as a guided oral lesson. Students record the amount they had to start, the amount they spent for the illustrated toy, and the amount they have left.



Had	Bought	Had left
		75¢ − 64¢ = 11¢
		37¢ − 32¢ = 5¢
		65¢ − 54¢ = 11¢
		28¢ − 24¢ = 4¢
		85¢ − 83¢ = 2¢
		55¢ − 41¢ = 14

142 one hundred forty-two

Problem solving

Reinforcement

Give oral addition and subtraction problems for the students to record and answer on paper. For example:
Had 45¢. Bought peanuts for 31¢. How much is left?

45¢
−31¢

Bought a comic for 25¢ and pop for 33¢. How much did it cost me?

25¢
+33¢

Enrichment

Have the students make up their own menus and questions as on page 141. Use these as job cards for other students to try. Record the answers on the backs of the cards or on a separate sheet.

Extra Practice

Worksheet PS7
Pages 141-142

How much in all?

Menu

Sandwich . . . 43¢
Milk. 20¢
Apple 15¢
Cookie 12¢

Sandwich 43¢ + Apple 15¢ = 58¢

Milk 20¢ + Apple 15¢ = 35¢

Apple 15¢ + Cookie 12¢ = 27¢

Sandwich 43¢ + Milk 20¢ = 63¢

UNIT 7 LESSON 8

Objective A26

Add three-digit numbers, no regrouping.

Vocabulary

Hundreds

Materials

Strips of coloured paper
Place-value chart (hundreds, tens, ones)

Introducing the Lesson

Before starting this lesson, distribute points for such things as tidy desks, quiet workers, helpful students, etc. Use strips of coloured paper as point markers (for instance, red = 100 points, green = 10 points, yellow = 1 point).

Have the students work in 6 or 8 groups or teams to count how many points they have amassed. Record the team names and points on the chalkboard.

Use this record and the collected point markers as the basis for introducing addition with three digits.

Teaching the Lesson

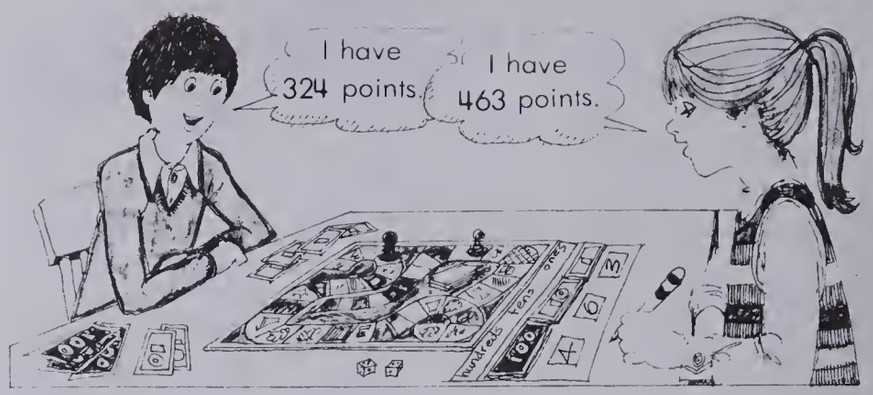
Review the use of a hundreds-tens-ones chart by having each team place their markers on the chart and record their score. If a group of ten ones or ten tens can be made, trade these markers for the next appropriate marker.

Record these scores on the chalkboard. Add a three-digit number to each score (be sure to make each number such that no regrouping will be required). Make up silly reasons for the extra points, such as "The blue team gets 132 more points for wearing nice socks. Give [100] [10] [10] [10] [1] [1] marks to that team."

Have students record the additional points under their first set of points.

Give each team the chance to add their point markers and then record the addition on the board. Add ones, then tens, then hundreds. Compare final scores.

Name _____



Keep score.



h	t	o
4	2	1



h	t	o
5	2	4

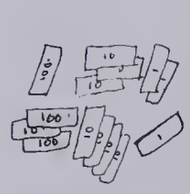


h	t	o
5	3	2

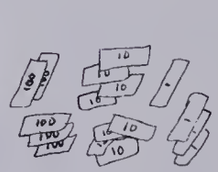


h	t	o
4	5	1

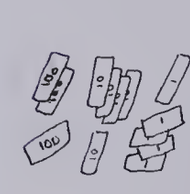
Add the scores. Start with the ones.



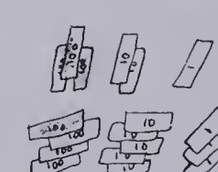
h	t	o
1	3	2
+ 3	4	1
4	7	3



h	t	o
2	4	1
+ 3	4	3
5	8	4



h	t	o
2	4	1
+ 1	1	4
3	5	5



h	t	o
3	2	1
+ 4	5	3
7	7	4

Using the Pages

- The exercises on page 143 provide practice in recording scores and adding sets of scores.
- Do the example at the top of page 144 as a group activity, then assign the bottom exercise as independent work.

GAMES DAY



	Team A	Team B	Team C
Boys	145	324	345
Girls	+ 212	+ 250	+ 350
Total points	357	574	695

Which team scored the most points? C

Add. Remember to start with the ones.

163 + 514 = 677	259 + 420 = 679	436 + 52 = 488	182 + 604 = 786
402 + 283 = 685	651 + 137 = 788	84 + 203 = 287	261 + 313 = 574
520 + 47 = 567	632 + 64 = 696	473 + 201 = 674	367 + 212 = 579

Extra Practice **Worksheet A26**
Pages 143-144

Add. Start with the ones.

372 + 415 = 787	515 + 283 = 798	463 + 324 = 787	635 + 234 = 869
284 + 604 = 888	736 + 261 = 997	348 + 321 = 669	526 + 172 = 698

Reinforcement

Use place-value blocks for building three-digit numbers, recording numerals, and adding ones, tens, and hundreds. Display the blocks on a place-value chart for students to interpret and record on paper.

322
+141

Enrichment

Provide examples with missing numbers. Ask students to find the missing numbers.

156 +□□□ = 489	□□□ +264 = 596	2□7 +□1□ = 839	4□□ +□□3 = 729

UNIT 7 LESSON 9

Objective A27

Subtract three-digit numbers, no regrouping.

Materials

Place-value blocks, stiff paper or cardboard, 12 to 18 bean bags or blocks, loops of wool or string

Introducing the Lesson

Ask the students to draw, colour, and cut out nine balloon shapes for each value: 100, 10, 1. Explain to the students that they are going to play an imaginary dart game. For every balloon they "break" by hitting it with a "dart" (bean bags or blocks), they subtract that value from the starting score. The team with the lowest score wins. Divide the students into teams of 4 to 6 members. Place the balloons on the floor, with 9 (100)s grouped on the left, 9 (10)s in the middle, and 9 (1)s on the right. Designate a throwing point. Each member of a team tosses 2 or 3 "darts" onto the game board. When all the members of a team have thrown their darts, count up the value of the "broken balloons". Record the starting value of 999 and subtract the broken balloon value to find the team score. Repeat with the next team and compare scores. Lowest score wins.

Teaching the Lesson

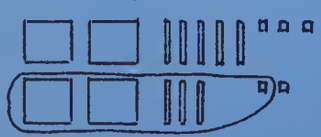
Ask a student to model 485 using place-value blocks. Then record:

$$\begin{array}{r} 485 \\ -231 \\ \hline \end{array}$$

Explain that you are starting with 485 and would like to subtract 231 to find the other part of 485. Ask another student to come up and loop 231 with wool or string. Count and record the remaining ones, tens, and hundreds, as in:

$$\begin{array}{r} 485 \\ -231 \\ \hline 4 \end{array}$$

"I have 5 ones to start. I loop 1, and 4 are left. I have 8 tens...."



Repeat with other three-place numbers.

Name _____



Subtract the ones first.

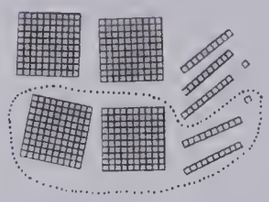
h	t	o
3	7	5
− 1	2	3
2	5	2

John had 375 blocks.
Anita won 123 of them.

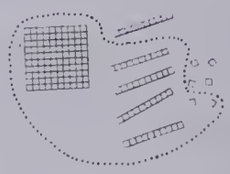
How many blocks does John have left?

252 blocks

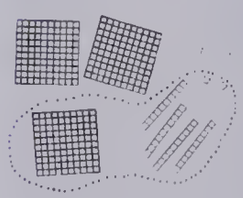
Subtract.



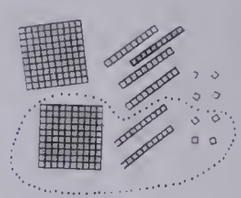
h	t	o
4	5	2
− 2	2	1
2	3	1



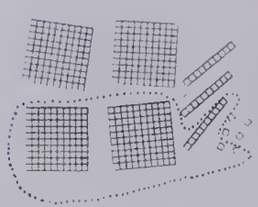
h	t	o
1	5	6
− 1	4	2
	1	4



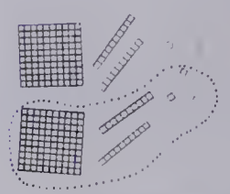
h	t	o
3	4	4
− 1	4	2
2	0	2



h	t	o
2	6	8
− 1	2	4
1	4	4



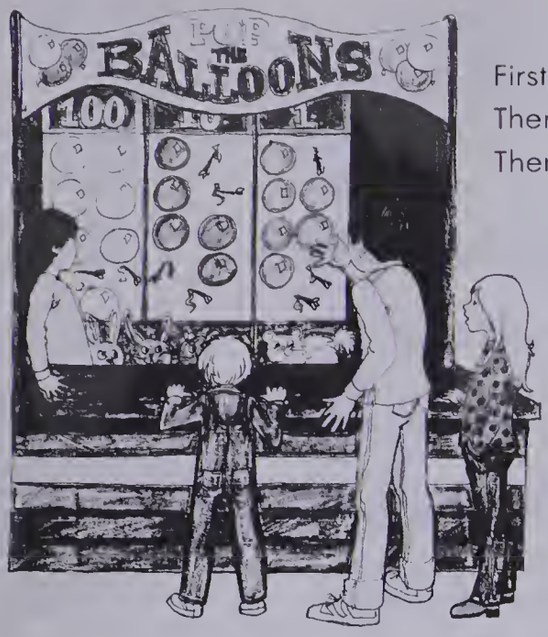
h	t	o
4	3	6
2	1	2
2	2	4



h	t	o
2	4	5
1	2	3
1	2	2

Using the Pages

- On page 145, students subtract the looped number from the starting set, as in the Teaching the Lesson section.
- Read the example on the top of page 146 together and assign the exercise as independent work. Check as the students work to see that they proceed from ones, to tens, to hundreds.



First, subtract the ones.
Then, subtract tens.
Then, hundreds.

hundreds	tens	anes
9	9	9
− 2	4	3
7	5	6

Subtract.

548 − 234 = 314	263 − 112 = 151	975 − 322 = 653	826 − 513 = 313
653 − 121 = 532	424 − 104 = 320	386 − 175 = 211	589 − 372 = 217
495 − 234 = 261	596 − 284 = 312	285 − 143 = 142	878 − 167 = 711

Extra Practice **Worksheet A27**
Pages 145-146

Subtract. Start with the ones.

487 − 126 = 361	539 − 207 = 332	646 − 335 = 311	784 − 543 = 241
863 − 261 = 602	974 − 751 = 223	568 − 156 = 412	678 − 440 = 238

Reinforcement

1. Do an oral subtraction exercise. Have the students record on paper or on the chalkboard. Use problems such as:

"Farmer Jones has a cow that weighed 286 kg. The cow went on a diet and lost 142 kg. How much does the cow weight now?"

Check each example orally before going on to the next problem. Ask the students to try to make up the problems.

2. Provide place-value blocks and loops of string for students to model the examples on page 146. Discuss these examples with the students as they work to ensure comprehension of the subtraction process.

Enrichment

Ask the students to supply the missing numbers in the following exercises.

647 − □□□ = 203	458 − □□□ = 145	□□□ − 347 = 642	8□3 − □7□ = 513	□65 − 3□□ = 420

UNIT 7 LESSON 10

Objective GR3

Interpret pictographs.

Vocabulary

Pictograph

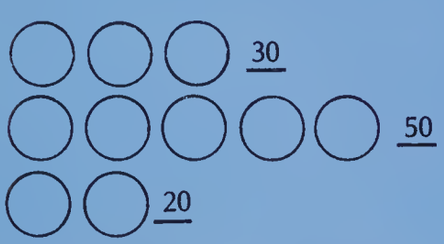
Materials

Paper plates, chalk, chart paper

Introducing the Lesson

Use paper cutouts of various shapes (or paper plates) to develop the idea of rates. Use examples such as the following:

"This pie can feed 10 people. How many people will these pies feed?"



Teaching the Lesson

Discuss with the students the other pictographs they have made. Explain that some information would take too many pictures to show on a pictograph, so sometimes one picture is used to represent several points or objects, etc.

To collect data for a footsteps pictograph, send pairs of students to various parts of the school. For every ten steps, the students stop and draw a shape with chalk. When they reach their destinations, they record how many leftover steps, then how many steps in all by counting. Discuss the results and record them on a large sheet of chart paper.

to the office	
+3	63 steps

Discuss what to do about leftover steps. (You can display part of a foot to show the extras, or round the number to 0 or 10.) Once the pictograph is complete, discuss the visual impact of the information, the ease of making comparisons, and any lack of exactness.

Name _____



Number of points each child has scored	How many points?
= 10 points	
Glen	50
Nora	30
Billy	60
Melissa	70
Suki	40



Number of points each team has scored	How many points?
= 5 points	
Jets	45
Lions	20
Rams	30
Hustlers	25
Spitfires	30

Pictographs one hundred forty-seven 147

Using the Page

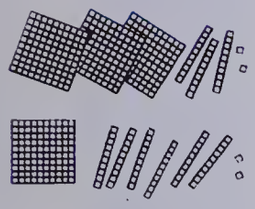
- Review counting by tens and fives. Discuss the topic of each graph on page 147, the rates involved, and the linear comparisons that are obvious. After some examples, assign the numerical interpretation (How many points?) for independent work.

Problem Solving Activities

Assign Level 2, Unit 7

Add. Nome _____

35 + 2 = 37	4 + 23 = 27	40 + 30 = 70	63 + 21 = 84
36 + 62 = 98	50 + 16 = 66	241 + 332 = 573	451 + 347 = 798



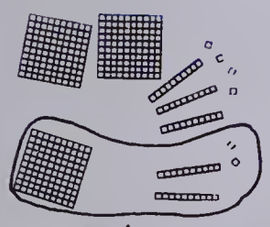
h	t	o
3	3	2
+ 1	6	2
4	9	4



tens	ones
4	5¢
+ 1	2¢
5	7¢

Subtract.

47 − 6 = 41	83 − 2 = 81	80 − 60 = 20	90 − 30 = 60
45 − 23 = 22	38 − 16 = 22	289 − 157 = 132	864 − 712 = 152



h	t	o
3	5	6
− 1	2	2
2	3	4



tens	ones
5	2¢
− 1	1¢
4	1¢

Extra Practice **Worksheet GR3**
Page 147

Skip count.

2	4	6	8	10	12	14	16
5	10	15	20	25	30	35	40
10	20	30	40	50	60	70	80
3	6	9	12	15	18	21	24

Reinforcement

Assign a footsteps graph for independent work. Have the students use the scale  = 2 steps and give them destinations in the classroom. Use a worksheet set up as shown. The boxes will help to keep the footsteps lined up for comparison purposes. Dots can be used in place of drawing footsteps, or the boxes can be coloured to correspond to the number of steps.

Footsteps					
 = 2 steps from my desk to:					
door					
chalkboard					
sharpener					
window					
teacher's desk					

Enrichment

Have the students think of situations where a pictograph would be a good way to record the information. Ask each student to choose a topic or question, research it, and display the information in the lesson format.

UNIT 7 TEST

Part 1: Adding two-digit and three-digit numbers without regrouping.

Part 2: Interpreting addition pictures.

Part 3: Subtracting two-digit and three-digit numbers without regrouping.

Part 4: Interpreting subtraction pictures.

UNIT 8
Measurement

Theme: Describing Things Around Us

Lesson		Objective	Pages
1	M5	Use nonstandard units to measure length.	149-150
2	M6	Measure length with a centimetre ruler.	151-152
3	M7	Estimate length in centimetres.	153-154
4	M8	Estimate and measure length in metres and centimetres.	155-156
5	M9	Estimate and measure temperatures to the nearest degree Celsius.	157-158
6	M10	Tell time to the hour.	159-160
7	M11	Tell time to the half-hour.	161-162
8	M12	Tell time to five-minute intervals.	163-164
9	M13	Order the months of the year, the days of the week, and the hours of the day.	165-166
10	PS8	Interpret and construct tables and bar graphs.	167
Test		Measurement	168

Vocabulary

measure
unit
shortest
centimetre (cm)
estimate
wide
metre (m)
degrees Celsius (°C)
thermometer
cool
hot
watch
hour hand
minute hand
date
week
year
today
bar graph
afternoon
length
units ruler
longest
centimetre ruler
guess
tall
metre stick
temperature
cold
warm
clock
o'clock
hour
minute
day
month
yesterday
tomorrow
morning

Printed Directions:

How many units long?
Circle the shortest unit.
Box the longest unit.
How many centimetres long?
Make a good guess.
Now measure with a centimetre ruler.
Now check your estimates.
Measure real objects in your room.
Print *more than* or *less than*.
Print the temperature.
What time is it?
Draw the hour hand.
Draw the minute hand.
Put each list in order.
Complete the bar graph.

Materials

Vocabulary Cards of measurement terms

metre	centimetre
height	width
length	measure

Demonstration thermometer for teacher and small thermometers for pupils

Demonstration clock for teacher and small clocks (with moveable hands) for pupils

Minute labels for the clocks (6 cm × 10 cm)

:00, :05, :10, . . . , :55

Numeral Cards 12 cm by 15 cm

1, 2, 3, . . . , 12

toy telephone
erasers
paper clips
crayons
centimetre cubes
index cards
chart paper
stickers
catalogs
bingo chips
pencils
string
scissors
small objects
metre sticks
year calendar
geometric stamps
magazines
graph paper
paper plates

About This Unit

Unit 8 develops the measurement topics of length, temperature, and time. Throughout the unit, measurement is viewed as one of the ways of describing objects in the world. Language descriptions involving length, temperature, and time are incorporated within the lessons and provide further breadth to the integrative theme *Describing Things Around Us.*

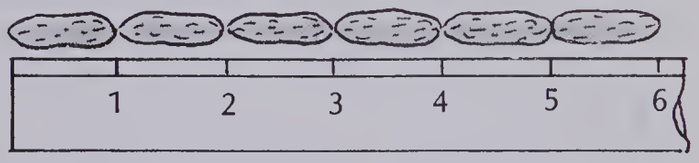
The key measurement concepts and skills introduced at this grade level are:

1. the use of nonstandard and metric units of measurement,
2. measurement with common measurement tools, and
3. estimation.

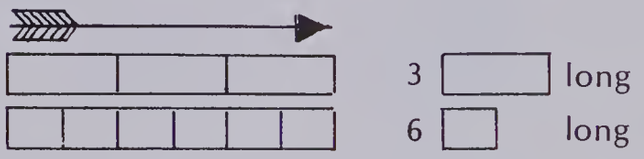
Further important ideas are:

4. the relationships of measurement concepts and skills with those of arithmetic, particularly numeration, addition, and subtraction; and
5. the interrelationships of various measurement units.

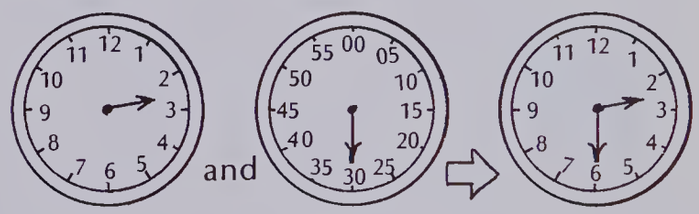
Measurement is seemingly a simple concept. Classroom experience and research show that this view is somewhat misleading. Students require frequent reminders of the nature of units of measurement and of their embodiment within standard tools for measurement.



The inverse relationship of unit size to the unit measurement (as discussed in Lesson 1, Enrichment section) is an example of a subtle concept which is difficult for some students to grasp.

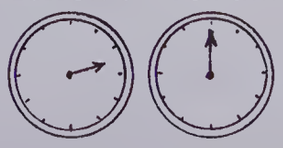


Combinations and relationships between units of measurement are essential for many practical measurement activities. As an example, the typical clock face combines the temporal units of minutes and hours. To complicate the situation, the typical marriage of the minute dial and hour dial disguises aspects of both.



One successful sequence involves: first, introducing the measurement of time using the two separate dials; next, as a transition stage, combining the two dials in a gradual progression; and finally, using typical clock faces to tell time. The sequence adopted here has been designed to facilitate a melding of a traditional approach and the 2-dial approach (if this is desired by the teacher).

Lesson 6 Tell time to the hour.



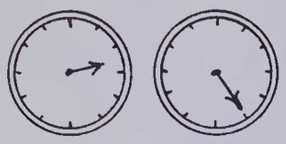
Only the hour dial may vary. The minute dial is set at 00.

Lesson 7 Tell time to the half hour.



The hour dial may vary. The minute dial is set at 00 or 30.

Lesson 8 Tell time to a 5 min interval.



The hour dial may vary. The minute dial is set to multiples of 5.

Ideas

By itself, Unit 8 of the student's workbook does not provide a satisfactory course for the measurements of lengths, temperature, and time. Successful measurement instruction requires a variety of activities and experiences. With the *Houghton Mifflin Mathematics* program, the teacher notes and suggestions serve as the essential, practical guide for a balanced approach.

The integrative theme of Unit 8 is "Describing the World Around Us". Teachers are encouraged to broaden the scope of this measurement unit through vocabulary development, informal discussion, and stories. The following books are recommended.

Abisch, R., *Do You Know What Time Is?*, Englewood Cliffs: Prentice Hall, Inc., 1968.

Anno, M., *The King's Flower*, New York: Collins, 1979. About a king who learns "Perhaps biggest is not best after all."

Berger, M., *Time After Time*, New York: Coward, McCann, 1975.

Branley, F., *How Little and How Much: A Book About Scales*, New York: Crowell, 1976.

Carle, E., *The Grouchy Ladybug*, New York: Crowell, 1977.

Cleary, B., *Ramona The Pest*, New York: Morrow, 1968. Ramona confuses quarter past eight with 8:25.

Evenson, A.E., *About the History of the Calendar*, Chicago: Children's Press, 1972.

Fey, J.T., *Long, Short, High, Low, Thin, Wide*, New York: Crowell, 1971.

Froman, R., *Bigger and Smaller*, New York: Crowell, 1971.

Froman, R., *Faster and Faster*, New York: Viking, 1965.

Gilleo, A., *About Meters*, Chicago: Children's Press, 1977.

Gilleo, A., *About the Thermometer*, Chicago: Children's Press, 1977.

Heide, F.P., *et al., How Big Am I?*, Chicago: Follett, 1968.

Heite, R., *The Day That Monday Ran Away*, New York: Lion Press, 1969.

Horn, A., *You Can Be Taller*, Boston: Little, Brown, 1974.

Johnson, C., *Will Spring Be Early? or Will Spring Be Late?*, New York: Crowell, 1959.

Jupo, F., *A Day Around the World*, New York: Abelard-Schuman, 1968.

Kellogg, S., *Much Bigger Than Martin*, New York: Dial Press, 1976.

Kessler, E. and L. Kessler, *Are You Square?*, New York: Doubleday, 1966.

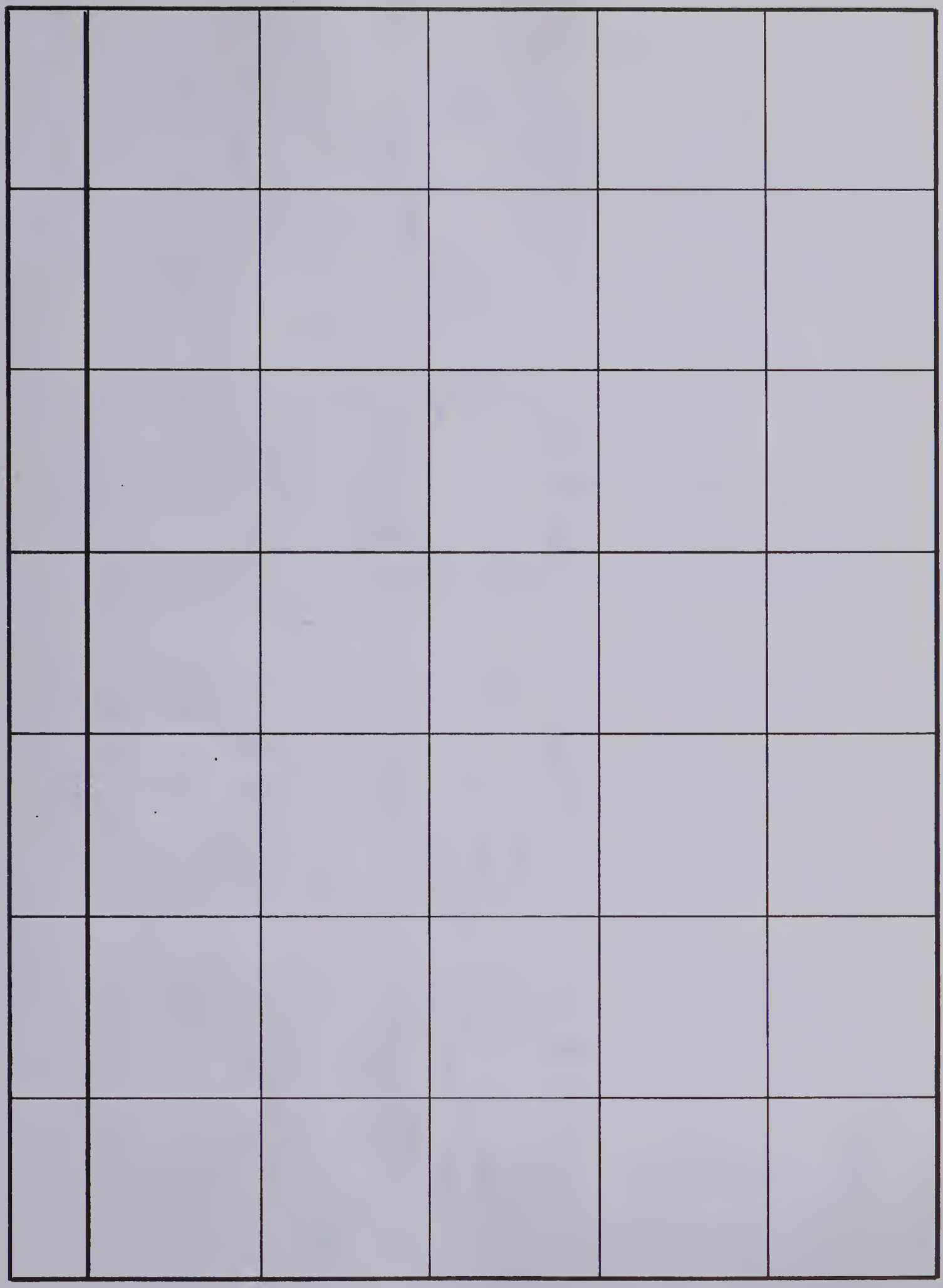
Mandoza, G., *The Scarecrow Clock*, New York: Holt, Rinehart and Winston, 1971.

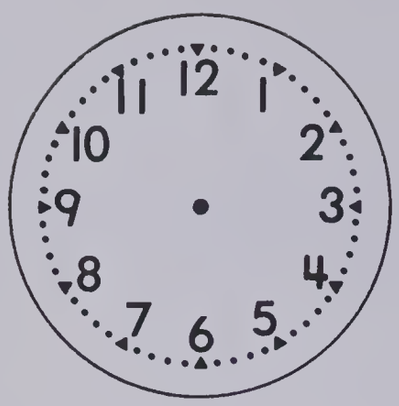
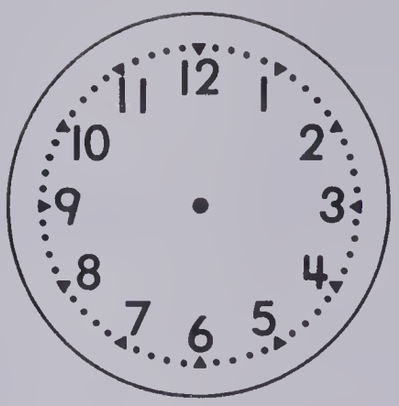
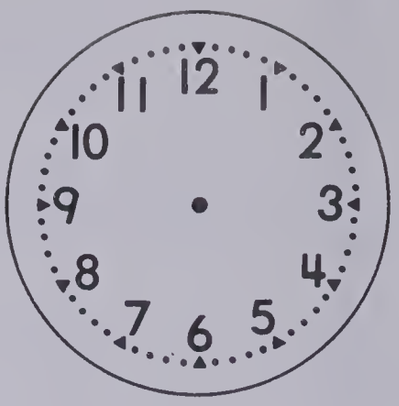
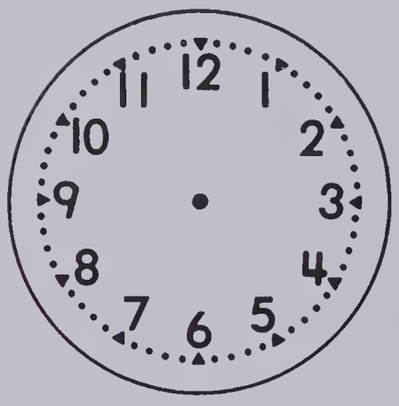
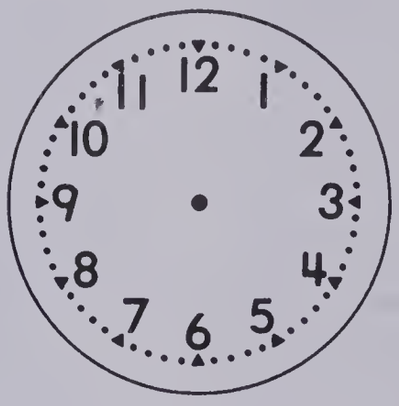
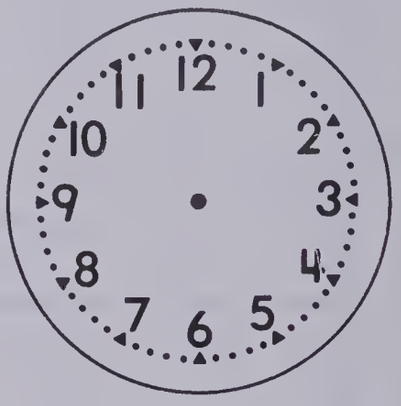
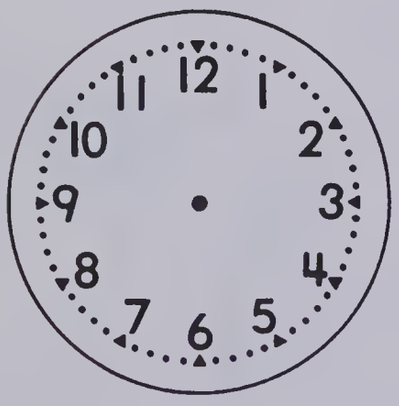
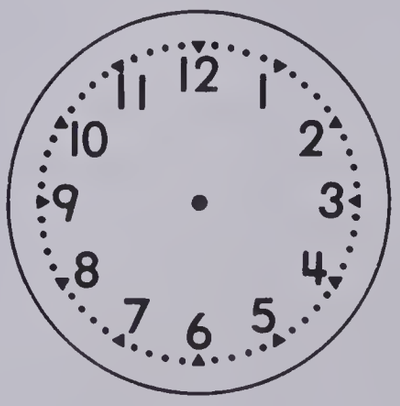
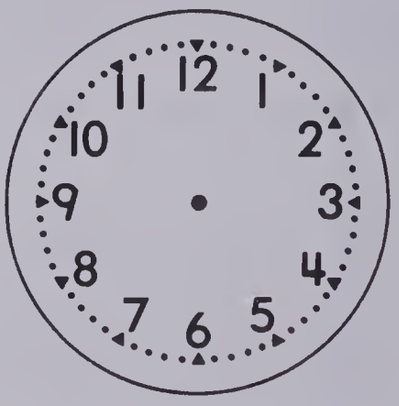
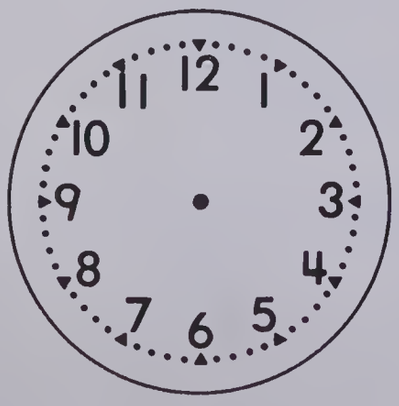
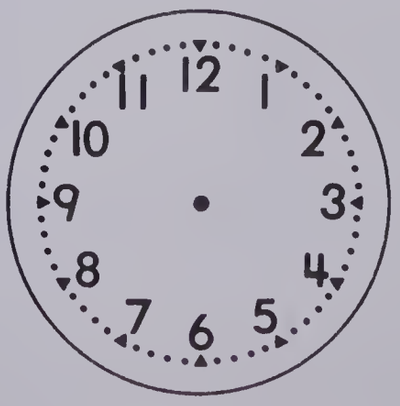
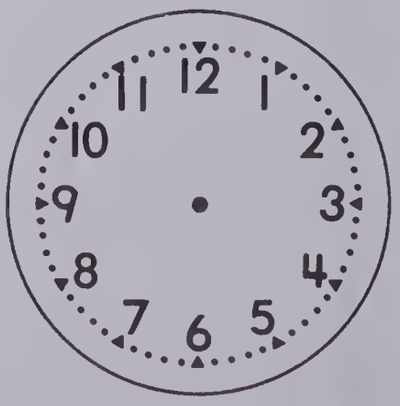
Peter, J., *What Time Is It?*, New York: Grossett & Dunlop, 1954.

Pine, Tillie, and Joseph Levine, *Measurements and How We Use Them*, New York: McGraw-Hill, 1974.

Waber, B., *The Snake: A Very Long Story*, Boston: Houghton Mifflin, 1978.

Yolen, J., *An Invitation to the Butterfly Ball*, New York: Parent's Magazine Press, 1976.

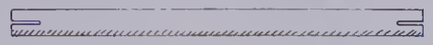


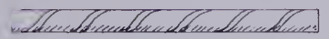













Name _____

Pretest **Unit 8**

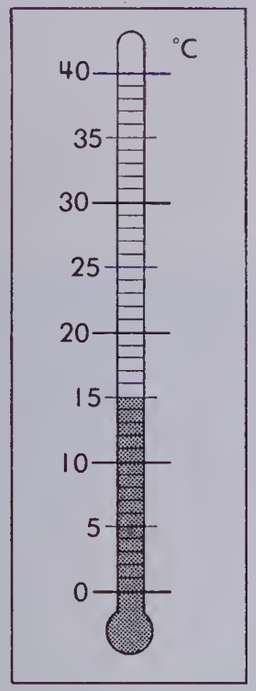
How long?

 8 cm

 6 cm

one metre is 100 cm

How warm is it?



15 °C

What time is it?



9:00



2:30



5:15

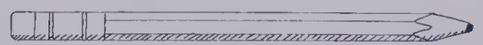


11:45

Name _____

Post-test **Unit 8**

How long?

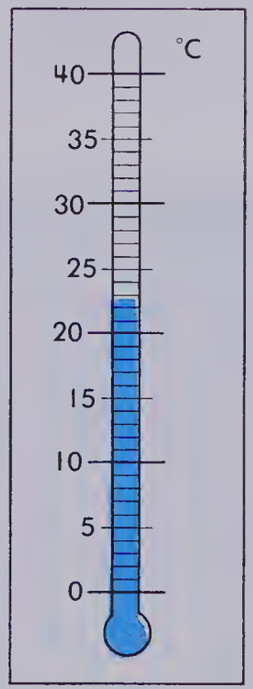
 9 cm

 7 cm

one metre is 100 cm

Colour to show the temperature.

23°C



What time is it?



8:30



10:45

Show the time.



2:15



12:05

UNIT 8 LESSON 1

Objective M5

Use nonstandard units to measure length.

Vocabulary

Measure, length, unit, *units ruler*, shortest, longest

Direction words: How many units long? Circle the shortest unit. Box the longest unit.

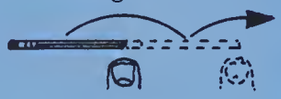
Materials

Toy telephone	New erasers
String	Used pencils
New pencils	Old erasers

Introducing the Lesson

Place on the floor a string that is exactly 4 new pencils long. Ask a student to try to describe, over a toy telephone, the length of the string. Explain that the person on the other end of the line has one new pencil and one new eraser, but no ruler. After considering various students' suggestions for solving this puzzle, measure the string using four new pencils.

Next demonstrate how to use just one new pencil and an index finger to measure the string.



Compare the repeated unit method with the method using several pencils. Discuss why the measurement answers are the same.

Try measuring the string with several shorter, used pencils. Ask whether an answer like "6 pencils long" gives enough information. Conclude that one size of pencil must be chosen as the **unit of measure** to avoid confusion.

Teaching the Lesson

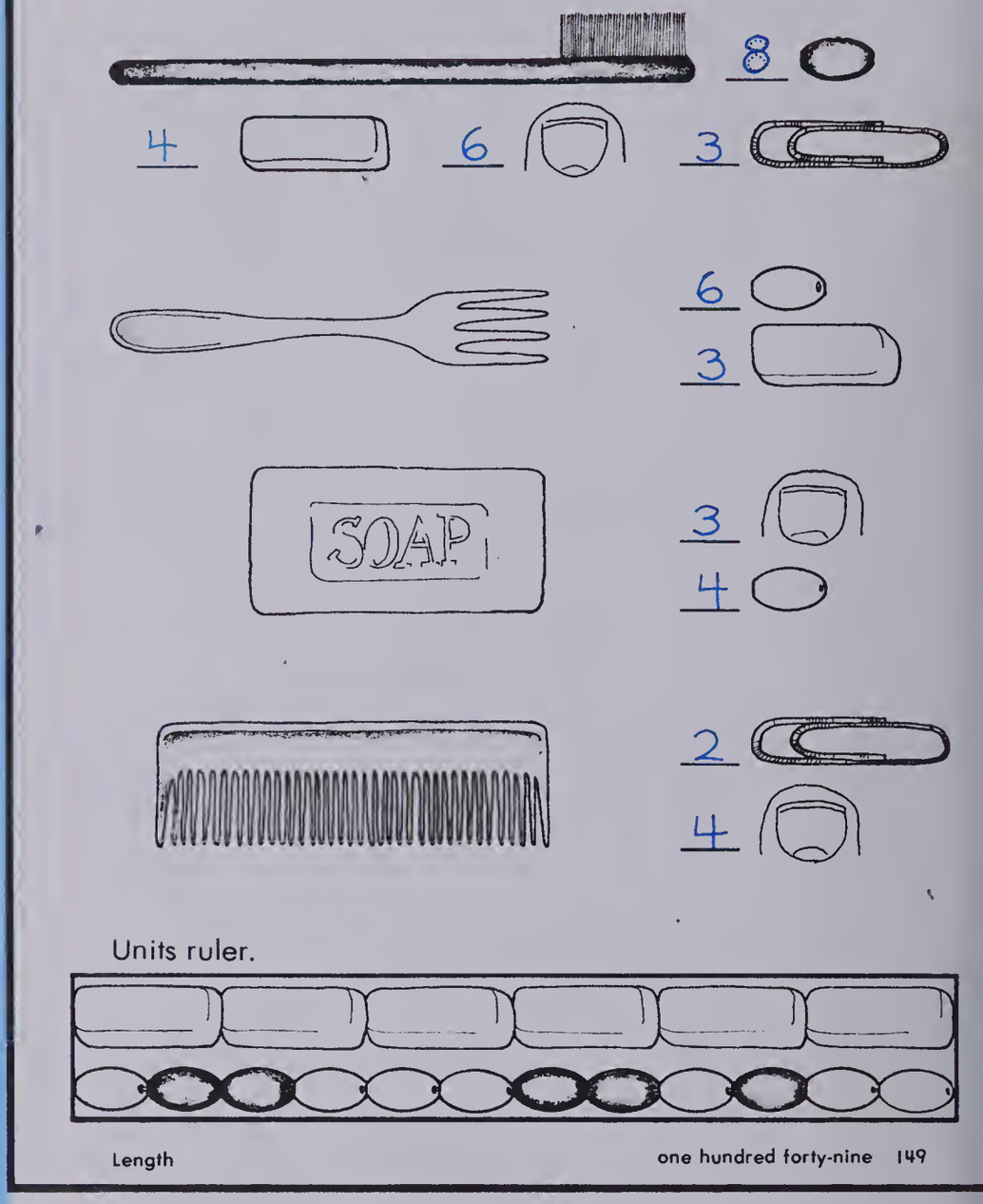
Make a list of common items that might be suggested as units for measurement of length. Discuss the appropriateness of the suggestions.

shoe — Different shoes have different lengths.

paper clip — There are different sizes of paper clips.

. . . and so on.

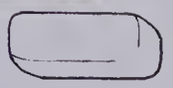
Conclude that people may have a difficult time agreeing on a unit.

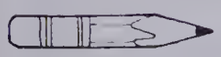
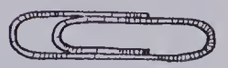


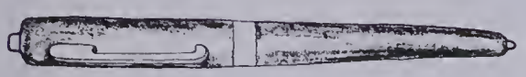
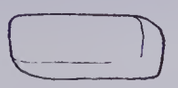
Using the Pages

- Ask the students to cut out carefully the units ruler on page 149. Note that the ruler is 6 erasers long, 12 beads long, 9 toenails long, and between 4 and 5 paper clips long (the latter two are shown on the back). Demonstrate how to use the units ruler to measure objects in the classroom before assigning pages 149 and 150.



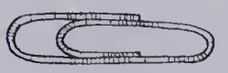
10  5 

 2  1 

 3 

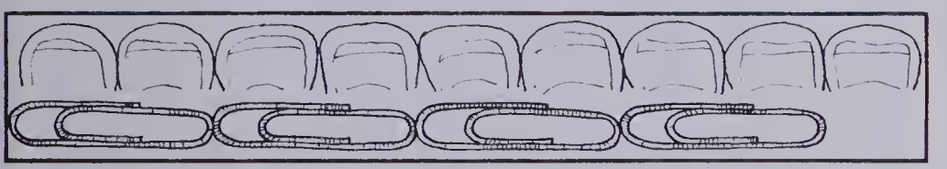
 7 

 5 

 2 

Circle the **shortest** unit. Box the **longest** unit.





Extra Practice

Worksheet M5
Pages 149-150

How **long** is a new pencil? Answers will vary.



How **wide** is your chair?

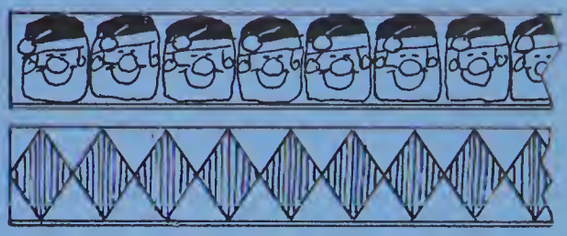


How **tall** is your desk?



Reinforcement

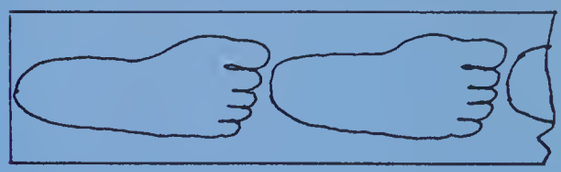
Nonstandard unit rulers may be constructed in several ways. Use holiday, animal stickers, or geometric stamps.



Cut strips from wrapping paper that have a pattern.

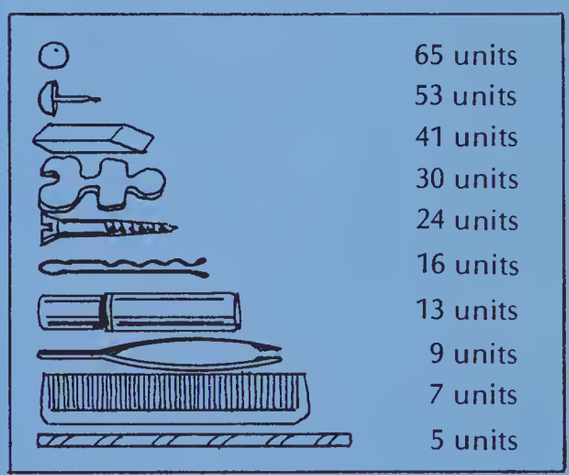


Trace body parts.



Enrichment

Challenge partners to measure a fixed length, for example, the width of a desk, using 10 different units of length. Each pair of students records their measurements on a chart that shows unit length in ascending order. Discover together that as the unit lengths increase, the number of units required for the measurement decreases.



UNIT 8 LESSON 2

Objective M6

Measure length with a centimetre ruler.

Vocabulary

Centimetre, cm, centimetre ruler
Direction words: How many centimetres long?

Materials

Scissors
Centimetre cubes
Centimetre ruler

Introducing the Lesson

Review some of the nonstandard units used in the previous lesson (new pencils, paper clips). Discuss the value of a standard unit (a unit that everyone knows about and uses the same way.) Introduce the centimetre length using a centimetre cube. Ask the students to say what they know about the centimetre. List their responses on chart paper. For example: "It is short. It is as wide as Mark's finger. 'cm' *stands for centimetre.*"

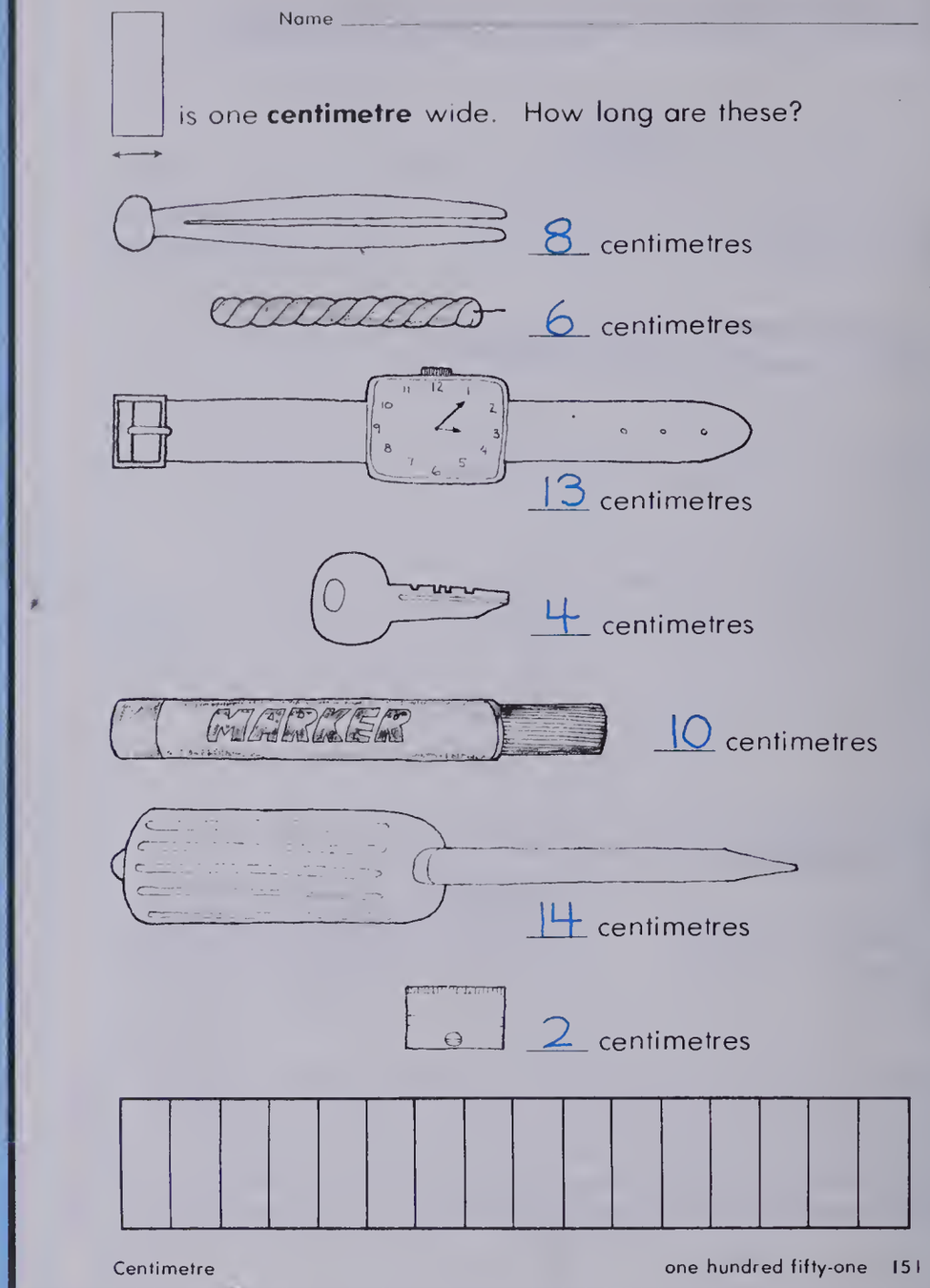
Teaching the Lesson

Use centimetre cubes to construct a centimetre ruler. Demonstrate how to measure short lengths using the Centicube ruler. Introduce the symbol "cm" for centimetre.



7 centimetres long
7 cm long

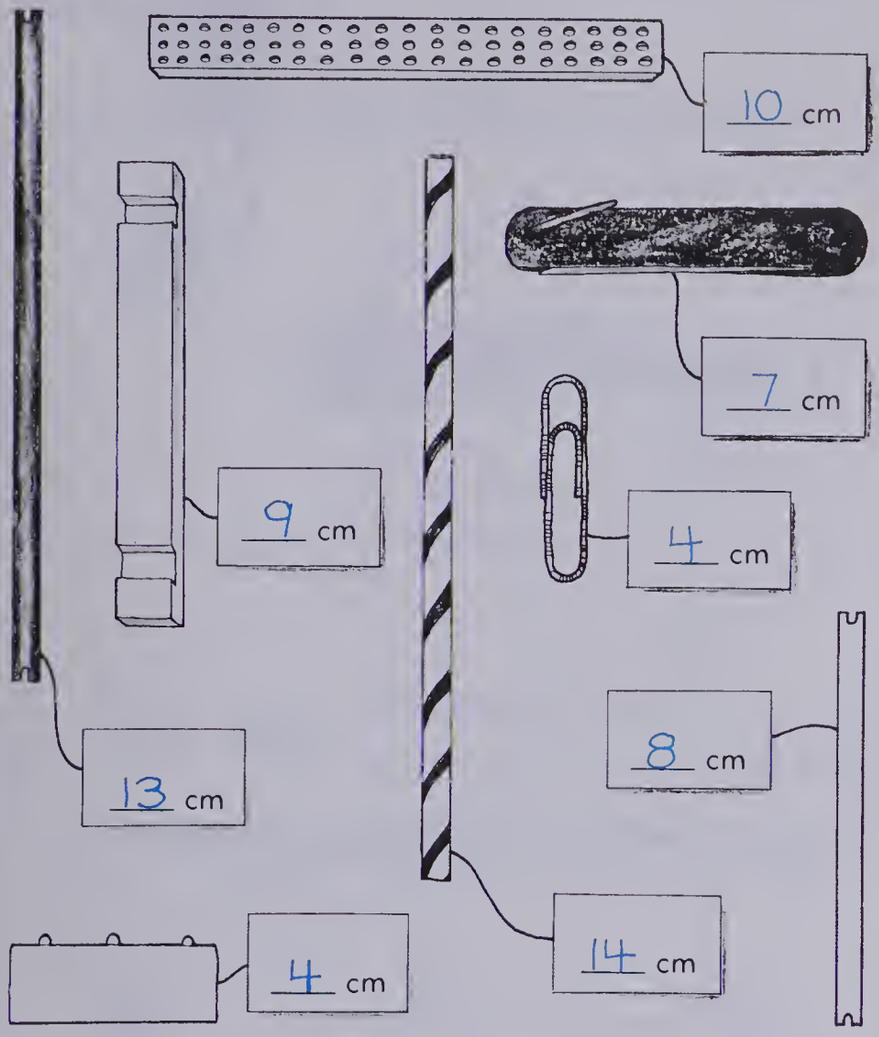
After measuring several items, complain that you are tired of counting for every measurement. Encourage someone to suggest numbering the cubes to save time. Use a felt pen and masking tape to implement this time-saving concept. Compare the results to an ordinary centimetre ruler. Use the centimetre ruler and the Centicube ruler to measure the same items.

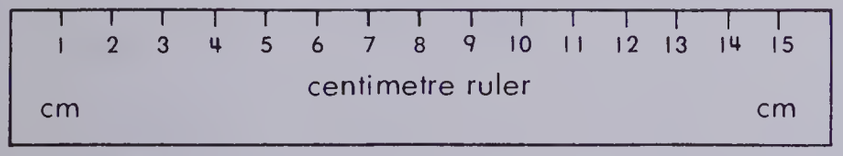


Using the Pages

- Have the students cut out the rulers on pages 151 and 152 and ask them to use the centimetre strip for measurements on page 151 and the centimetre ruler for measurements on page 152.
- A common error is using the 1 on the centimetre ruler as the starting position. Show the students how to place the ruler so that they start measuring from 0.

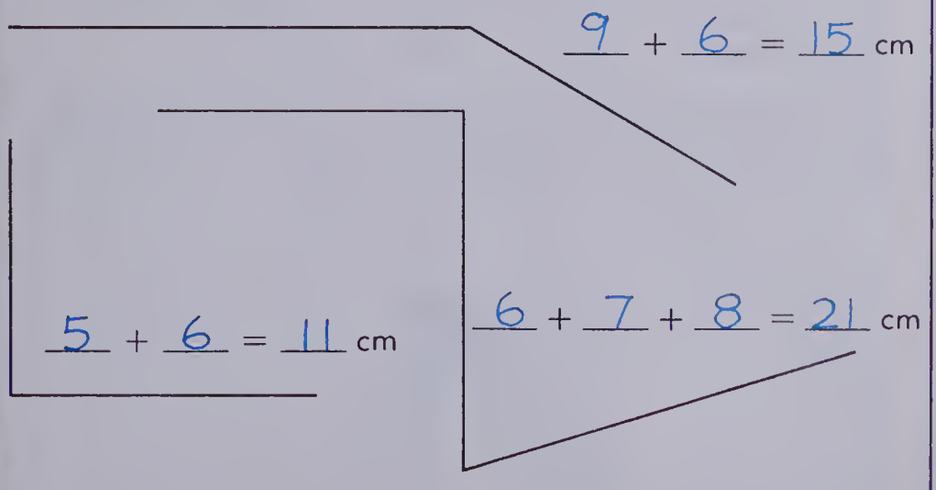
How many centimetres long? 1 cm





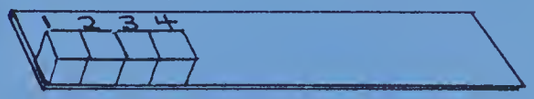
Extra Practice **Worksheet M6**
Pages 151-152

Measure each path.

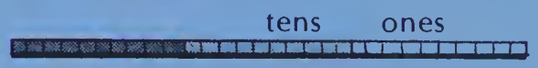


Reinforcement

1. With the aid of centimetre cubes, students can make their own centimetre rulers on cardboard strips. This simple activity can uncover misconceptions about measurement units, number lines, and rulers.



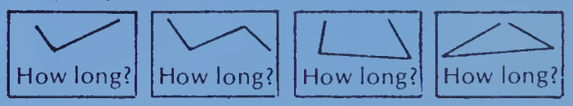
2. The *Counting On Ruler*. Construct a Counting On Ruler with Centicubes so that sets of ten cubes have the same colour. Demonstrate how to use this base ten arrangement to quickly determine the length of an object (counting by tens) rather than counting each individual Centicube.



Investigate both of the following methods to measure objects.
Method 1: Count by tens and ones: 10, 20, 21, 22, 23.
Method 2: Use place-value techniques: 2 tens, 3 ones is 23.

Enrichment

Length is additive: the length of two objects laid end to end is the sum of the individual lengths. Prepare a sequence of work cards that leads into simple perimeter tasks.



Have the students investigate several ways of determining the length of the paths.

Method 1 Use the ruler as an adding-on instrument.



Method 2 Make separate measurements and add.



5 + 7 = 12 cm

Method 3 Use Centicubes to relate to the addition models used in Units 2 and 4.



5 + 7 = 12 cm

UNIT 8 LESSON 3

Objective M7

Estimate length in centimetres.

Vocabulary

Estimate, guess, measure, wide, long, tall

Direction words: Make a good guess. Now measure with a ruler. Now check your estimates. Measure real objects in your room.

Materials

Centimetre rulers
Metre sticks
Centimetre cubes
Small objects

Introducing the Lesson

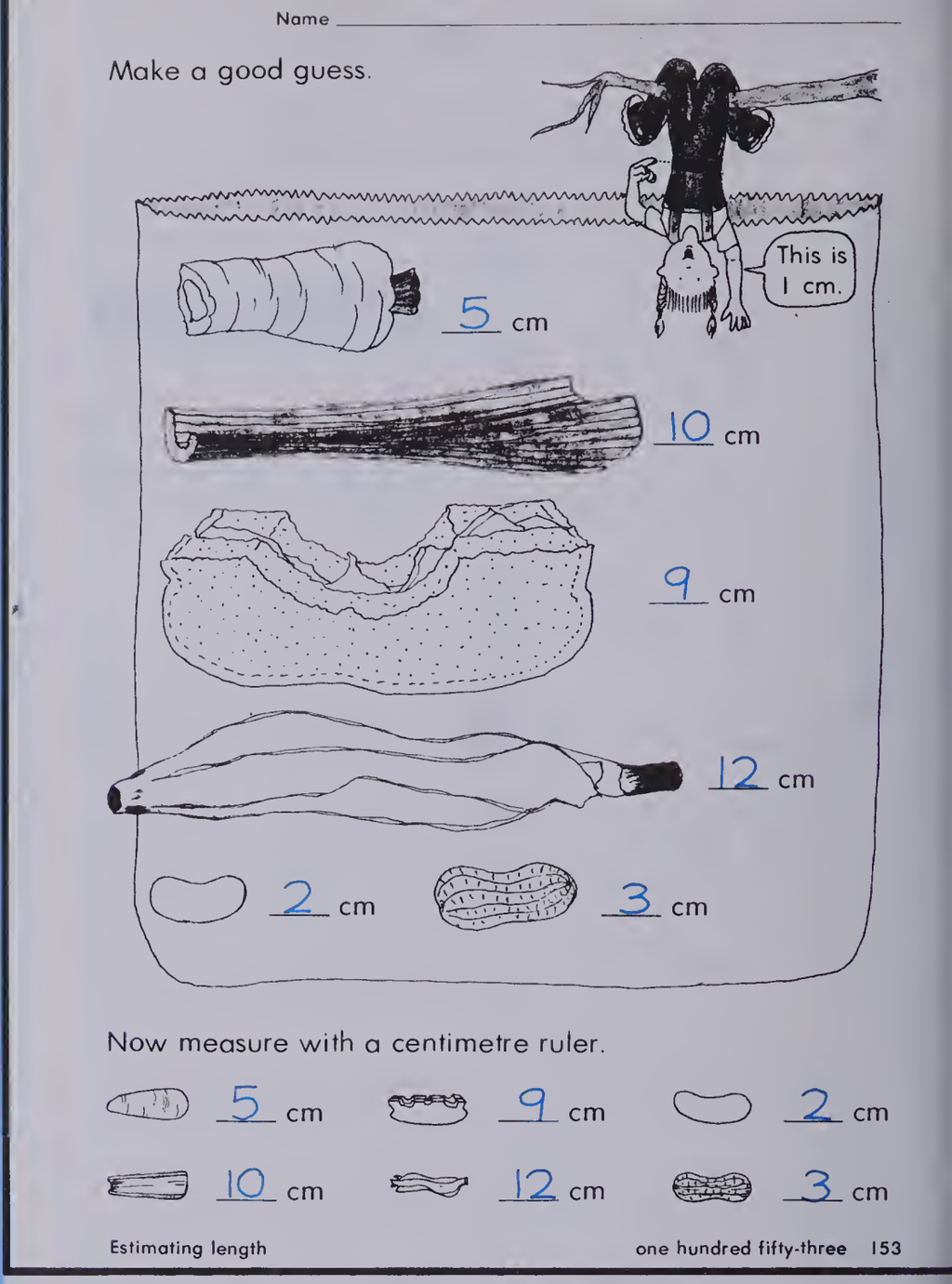
Hand everyone a centimetre cube. Students should recall that the centimetre is a unit for measuring length. Display a common object, such as a notebook. Challenge the students to estimate (make a smart guess about) the object's length. Record the guesses on the chalkboard either as a list or as a bar graph. Check the guesses using a centimetre ruler. Repeat this guided activity with other objects.

3 cm	4 cm	5 cm
Jim	Kay	Henry
Bill	Joe	
Nan	Bob	
	Frank	

Teaching the Lesson

Hold up a metre stick. Examine it as a number line in centimetres. Show students how to use the stick to measure lengths to 100 cm. Let everyone practise positioning the stick and reading the measurements from it.

Review the measurement words **wide**, **long**, and **tall**. Use these words to describe common objects in the classroom.



Using the Pages

- Make certain that students estimate the lengths on pages 153 and 154 before they measure. Remind students that a smart guess doesn't always result in a correct answer. You may want the students to hide their centimetre rulers until the estimates have been completed.
- The pictures on page 153 are near to actual size and those on page 154 are not. Before assigning either page, you may wish to use activities from the Reinforcement section.

Estimate.



Make a smart guess.



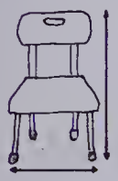




21 centimetres wide

28 centimetres long

Answers may vary.



____ centimetres wide

____ centimetres tall



____ centimetres wide

____ centimetres long

Now check your estimates.

Measure real objects in your room.







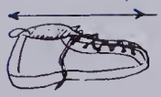
21 cm ____ cm ____ cm

28 cm ____ cm ____ cm

Extra Practice

Worksheet M7
Pages 153-154

Answers will vary.

Guess		Measure
_____ cm	shoe length 	_____ cm
_____ cm	thumb length 	_____ cm
_____ ____	arm length 	_____ ____
_____ ____	thumb width 	_____ ____
_____ ____	wrist width 	_____ ____
_____ ____	arm width 	_____ ____

Reinforcement

Prepare a set of **Cliffs and Ladders** work cards to combine skill in measurement, in finding missing addends, and in subtraction. On each card write a length for the ladder, a height for the cliff, and: "How much longer does the ladder need to be to reach the top of the cliff? Use two methods and record your solutions."



On a "Directions" card write:

Method 1 Transfer the ladder length to the cliff using a centimetre ruler or Centicubes. Then count how many more centimetres are needed to reach the top of the cliff. Record the answer as an addition sentence.

8 cm	+	5 cm	=	13 cm
ladder		more		cliff

Method 2 Measure the lengths of the ladder and cliff. Then subtract the lengths.

13 cm	–	8 cm	=	5 cm
cliff		ladder		more

When a student has completed several of the cards, discuss the relationship between the two methods of solution.

2. Continue to use the **Counting on Rulers** described in the Lesson 2 Reinforcement section.

Enrichment

1. Experience with the **decimetre** unit enables students to make more reasonable estimates. A decimetre, which equals ten centimetres, can be associated easily with common hand measurements (for example, from about the tip of the index finger to the tip of the thumb).

Discuss and help the students to practise the following equivalents. Stress the direct relationship with place value.

1 dm = 10 cm	1 ten = 10
2 dm = 20 cm	2 tens = 20
3 dm = 30 cm	3 tens = 30

Have students estimate lengths of over 30 cm in decimetres and then translate to centimetres. This will improve their estimation skills.

UNIT 8 LESSON 4

Objective M8

Estimate and measure in metres and centimetres.

Vocabulary

Metre, metre stick, estimate, measure, width, height, length, m, cm
Direction words: Print *more than* or *less than*.

Materials

Metre sticks
Vocabulary Cards

Introducing the Lesson

Introduce the terms **metre** and **metre stick**. Practise measuring distances and lengths in metres. Make three lists of objects suggested by the students.

less than one metre	*about one metre*	*more than one metre*
pencil	supply cupboard (width)	door (height)

Teaching the Lesson

Have the students practise estimating distances in metres. Then use metre sticks to measure the distances. When the students encounter a distance that is not an even number of metres long, discuss with them how part of a metre can be recorded. At first have the students lay their centimetre rulers at the end of the metre sticks. Record the length.



2 m 9 cm

Next point out the centimetre markings on the metre stick. Ask the students to tell how many centimetres make up one metre. *100* Use metre sticks to determine the entire length of the same objects. Ask the students to find lengths in metres and centimetres and to use the symbols m and cm to record the results. For example: bulletin board—2 m and 23 cm.

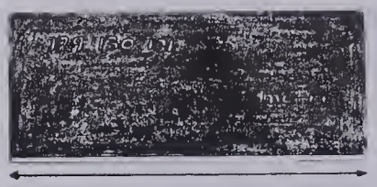
Use Vocabulary Cards to review measurement words with the students: centimetre, metre, height, width, length, estimate, measure. Ask the students to demonstrate each term.

Name _____

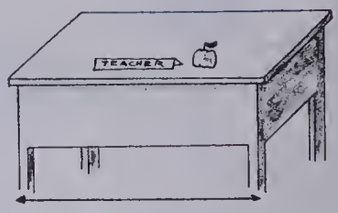


Answers will vary.

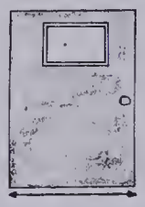
Print **more than** or **less than**.



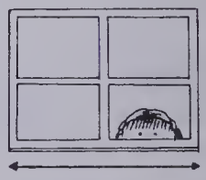
more than a metre



more than a metre



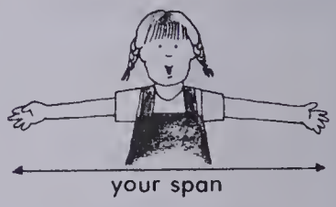
less than a metre



more than a metre



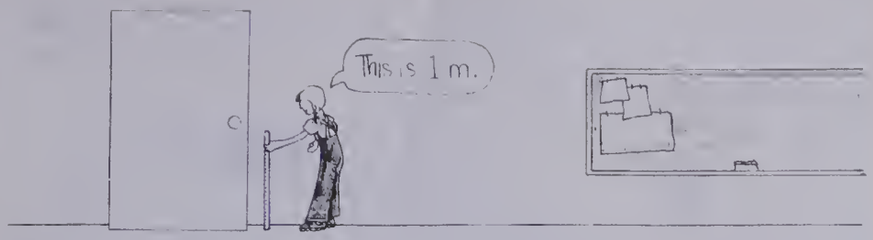
less than a metre

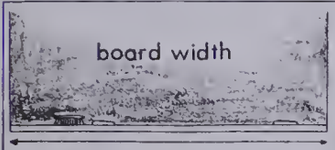
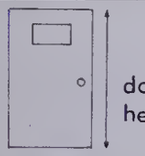
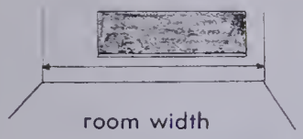
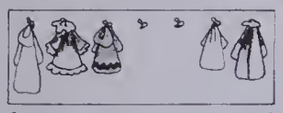
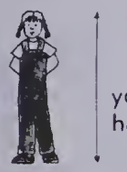


less than a metre

Using the Pages

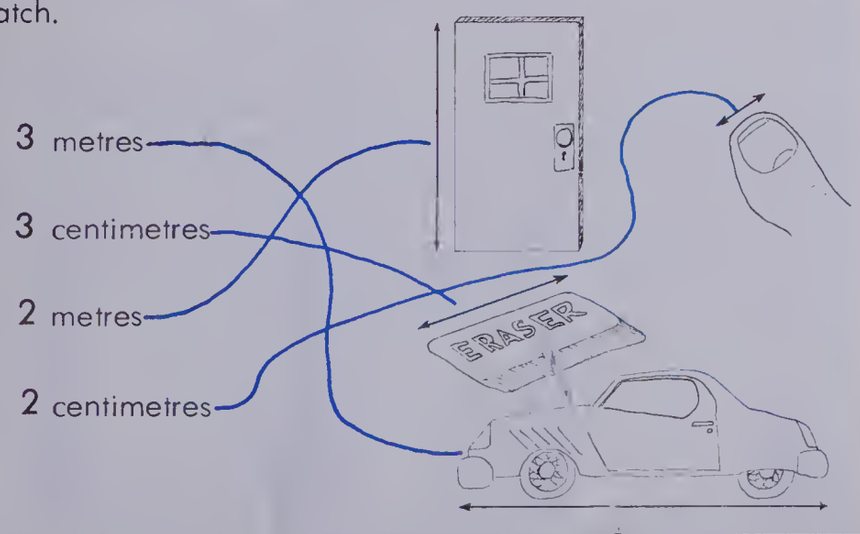
- Do not assign page 155 until the students have had considerable practice measuring metres and centimetres.
- It is recommended that no more than ten students at a time do the measuring for page 156. Other students could be occupied with the activities in the Reinforcement section.



	Guess.	Measure.
 board width	about ____ m	Answers will vary. ____ m and ____ cm
 door height	about ____ m	____ m and ____ cm
 room length	about ____ m	____ m and ____ cm
 room width	about ____ m	____ m and ____ cm
 coat rack	about ____ m	____ m and ____ cm
 your height	about ____ m	____ m and ____ cm

Extra Practice **Worksheet M8**
Pages 155-156

Match.



Reinforcement

Have students make a metre collage by pasting drawings or pictures from magazines and catalogs in the appropriate categories.

about 1 metre	about 2 metres	about 3 metres

Enrichment

1. Adapt the paths concept (from page 152) for use with metre lengths. Masking tape or soft chalk can be used to make paths on the classroom floor or in the hallway.

Adapt the cliffs and ladders concept (from page 154) for use with metre lengths.

2. Have the students demonstrate the following equivalents using metre sticks. Point out the relationships with place value.

1 m = 100 cm	1 hundred = 100
2 m = 200 cm	2 hundreds = 200
3 m = 300 cm	3 hundreds = 300
4 m = 400 cm	4 hundreds = 400

3. Have the students practise converting metre and centimetre measurements to centimetre measurements. Combine this activity with three-digit addition as introduced in Unit 1.

3 m and 62 cm

$$\begin{array}{r} 300 \\ +\ 62 \\ \hline 362 \end{array}$$

3 m and 62 cm = 362 cm

Problem Solving Activities

Assign Level 2, Unit 8

UNIT 8 LESSON 5

Objective M9

Estimate and measure temperature to the nearest degree Celsius.

Vocabulary

Degrees Celsius, °C, temperature, thermometer, cold, cool, warm, hot
Direction words: Print the temperature.

Materials

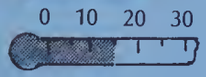
Demonstration thermometer
Small thermometers

Introducing the Lesson

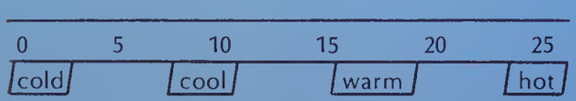
Ask the students to suggest temperature words such as cold, hot, cool, mild, etc. List their suggestions on the chalkboard. Work together to order the words from coldest to hottest. Complete the following sentences with the students.
A centimetre ruler is used to measure length in centimetres.
A _____ is used to measure temperature in _____. (Answer: thermometer; degrees Celsius)

Teaching the Lesson

Use a demonstration thermometer to show the students how to read temperatures. Start with temperatures that are multiples of ten, then try multiples of 5. Relate the skill to reading a bar graph. As each temperature is read, write it on the chalkboard. Finally, have the students read temperatures to the nearest degree, say them, and write them.

See	Say	Write
	20 degrees (Celsius)	20°C
	15 degrees (Celsius)	15°C

Tape four temperature labels (cold, cool, warm and hot) at appropriate intervals on the demonstration thermometer.

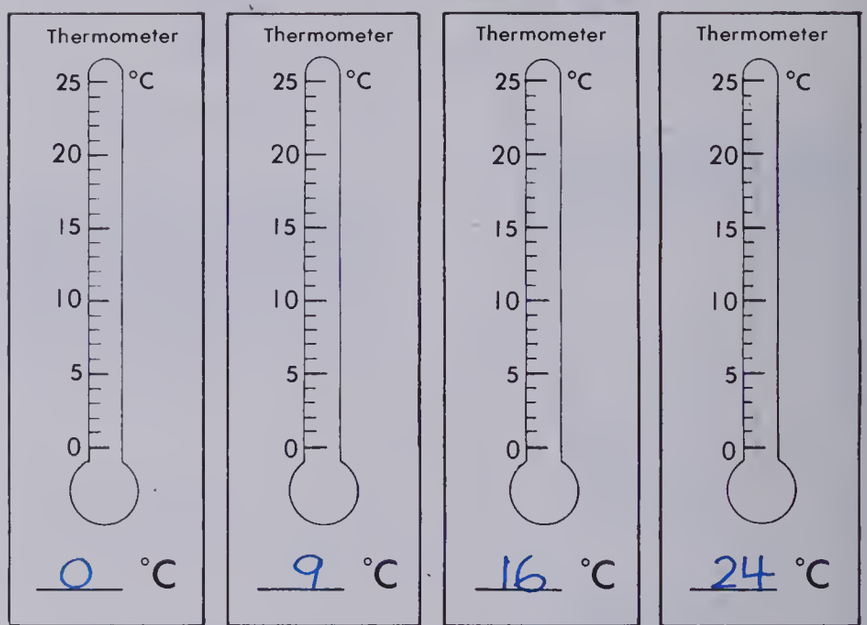


List activities and conditions associated with each of the four categories.

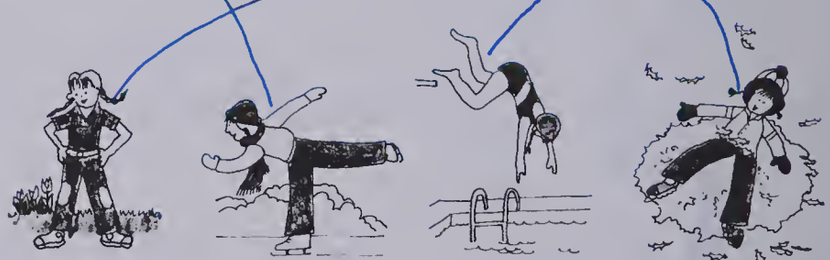
Name _____

Print the temperature.





Match.

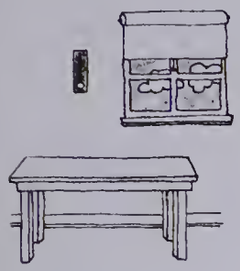


Temperature one hundred fifty-seven 157

Using the Pages

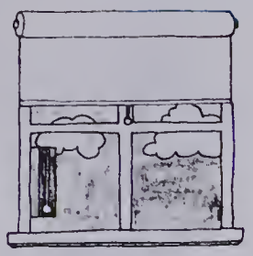
- On page 157, the students are asked to read temperatures to the nearest degree and to associate each temperature with an appropriate activity at the bottom of the page.
- Page 158 can be used most effectively if the six situations illustrated are actually set up in the classroom. Ask the students to estimate the temperatures without the aid of thermometers. Then have them check their estimates by reading from thermometers. Warn the students to touch neither the container nor the thermometer at the boiling water station; if the reading is not easily seen, tell them the boiling temperature.

Estimate the temperatures. Answers will vary.



inside

Examples 22 °C



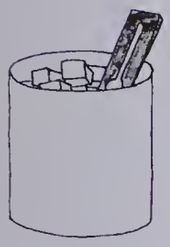
outside

15 °C



lamp

40 °C



ice

0 °C



tap water

10 °C



boiling water

100 °C

LOOKING BACK

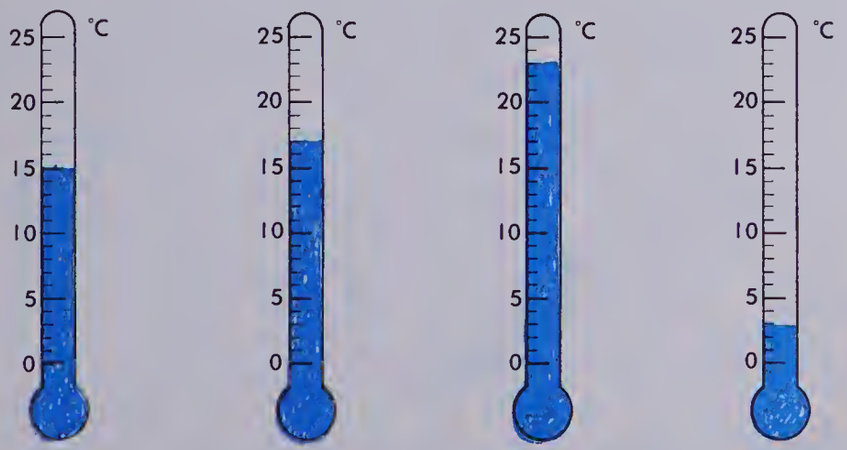
Count.

95	96	97	98	99	100	101	102	103	104
198	199	200	201	202	203	204	205	206	207
765	766	767	768	769	770	771	772	773	774
0	5	10	15	20	25	30	35	40	45

Extra Practice **Worksheet M9**
Pages 157-158

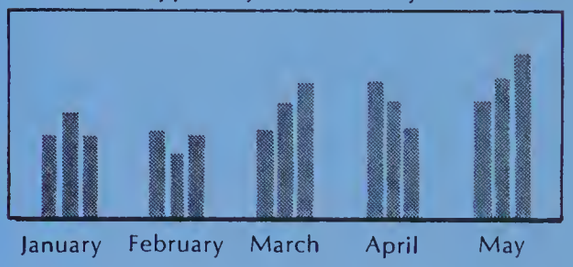
Colour the thermometer 

15°C 17°C 23°C 3°C

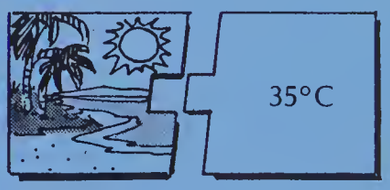


Reinforcement

1. Keep a calendar and weather report with a temperature bar graph showing temperatures for Mondays (or for first days of the month) before school, at lunch, and after school. Discover and discuss how the seasons and temperatures are typically related in your area.



2. Use pictures from travel magazines to prepare a set of temperature matching puzzles.



Enrichment

There are many words and phrases for describing temperatures. Use and compare words from the following lists.

cold	cool
freezing	chilly
icy	fresh
ice-cold	cool as a cucumber
frigid	nippy
cold as ice	hot
warm	roasting
mild	boiling
lukewarm	piping hot
fair	feverish
balmy	fiery
toasty	hot as pepper
warm as toast	hot enough "to fry an egg on the sidewalk"

UNIT 8 LESSON 6

Objective M10

Tell time to the hour.

Vocabulary

Clock, watch, hour hand, o'clock
Direction words: What time is it?
Draw the hour hand.

Materials

Demonstration clock
Small clock faces

Introducing the Lesson

Say to the students, "We use centimetre or metre rulers to measure length. What do we use to measure time?" *Clocks and watches* "What else could we use?" *The sun, a candle, a tapping foot,* etc. Discuss their suggestions. Lead them to the awareness that anything that marks the passing of time fairly evenly could be used.

Teaching the Lesson

Point to the hour hand on the demonstration clock. Explain that it takes one hour for this hand to move from one numeral to the next. Have the students suggest events that last about one hour, such as lunch break, some T.V. programs, reading period, and so on. Twirl the clock's hands and ask someone to describe which hand is used to measure hours. *The hour hand is the shorter hand.*

Use the demonstration clock face to demonstrate telling time to the hour. Place the minute hand on 12 and leave it there. Explain that the minute hand will be used later in the week. Set the demonstration clock at 3:00. Show the students that the small hand points to the hour and print the time. Vary this procedure by saying a time and asking the students to print it and draw it on a small clock face on their clock worksheet (which is provided with this *Teacher's Resource Book*).

Show the time.	Say the time.	Print the time.
	*3 o'clock*	3:00 3 o'clock

Name _____

What time is it?



3 o'clock

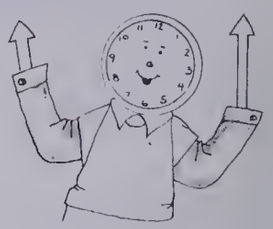
3:00



9 o'clock

9:00

The **hour hand** is shorter.





7 o'clock

7:00



1 o'clock

1:00



8 o'clock

8:00



6:00



4:00



2:00



12:00



5:00



11:00

Using the Pages

- The clock man reminds students that the hour hand is the shorter hand. In the last two rows on page 159 students must print the correct time with only the colons as aids.
- The hour hands drawn by the students should be shorter than the minute hands. Assign the exercises at the bottom of page 160 after the events and times have been discussed with the students.

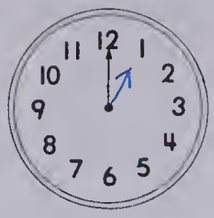
Draw the hour hand.



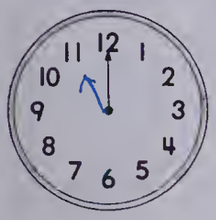
7 o'clock



5 o'clock



1 o'clock



11:00



3:00



12:00

About what time is it? Answers may vary.







7 o'clock

12 o'clock

6 o'clock

Extra Practice

Worksheet M10
Pages 159-160

Circle the hour hand.



Show the times.

3 o'clock



6:00 o'clock



11 o'clock



Reinforcement

Prepare a set of clock flash cards as shown below. As students progress with telling time add more difficult cards to the set. Provide students with a small clock face and a recording sheet.

Front



Back

2:00

Student prints the time and checks with the front.

Student makes the time and checks with the front.

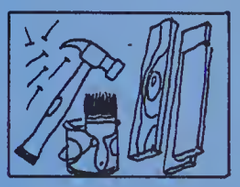
Enrichment

Activities and discussion should be undertaken which facilitate a wider conception of time than that connected with telling time from clocks.

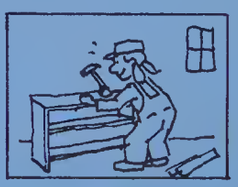
1. *Vocabulary*—past, yesterday, last week, present, today, right now, then, future, tomorrow, next week, soon, late, later, after, longer, early, before, sooner, shorter, fast, quick, slow, when, once, never, sometime, often

2. *Sequences*—sequences of events, story sequences, activity sequence, sequences of pictures, logical sequences, memory sequences

1



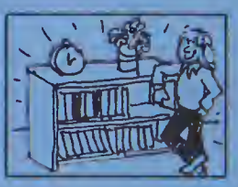
2



3



4



UNIT 8 LESSON 7

Objective M11

Tell time to the half-hour.

Vocabulary

Minute, minute hand, o'clock
Direction words: Draw the minute hand.

Materials

Demonstration clock
Minute labels :00 and :30
Small clock faces

Introducing the Lesson

Introduce the minute hand as the clock's way of measuring by minutes. Note that the minute hand is longer than the hour hand. Set the minute hand at 12. Attach the label :00. Explain that this is the start of an hour. Move the minute hand clockwise, counting by 5s from 0 to 30. Attach the label :30 at the appropriate place. Continue counting by 5s to 60. Emphasize that there are 60 minutes in an hour.

Teaching the Lesson

Challenge the students to guess what the hour hand does while the minute hand circles the clock face. (It slowly moves from 3 to 4.) Discuss that the hour hand points directly at a numeral only when the minute hand is at the :00 position. Show how the hour hand points between two numbers when the minute hand is at :30. Explain why the following times are:



3:30 not 4:30



6:30 not 7:30



12:30 not 1:30

Have students practise telling time to the hour and half hour. Show a time on the demonstration clock. Have the students say the time and print it. Vary this procedure by printing a time and asking students to say it and to show it on a small clock face.

Show the time.	Say the time.	Print the time.
	*8 thirty*	8:30 8 thirty eight thirty

Name _____

What time is it?



2 thirty

2 :30



3 thirty

3 :30





8 thirty

8 :30



4 thirty

4 :30



9 o'clock

9 :00



5 thirty

5 :30



3 o'clock

3 :00



6 thirty

6 :30



10 o'clock

10 :00



12 thirty

12 :30



4 o'clock

4 :00

Time to the half-hour

one hundred sixty-one 161

Using the Pages

- The clock man reminds students that the minute hand is the longer hand. The exercises on page 161 focus attention on the hour hand. If the hour hand points between two numerals, remind students to go back (counter-clockwise) to find the hour. This will be the smaller of the numbers (except for the 12-1 situation).
- Before having the students attempt page 162, encourage them to read the hour hand first and record the hours to the left of the colon. The minute hands drawn by students should clearly be longer than the hour hands.

00 05 10 15 20 25 30 35 40 45 50 55

What time is it?


5:30


8:00


2:30


11:00


10:30


12:30

Draw the minute hand.


3 thirty


10 o'clock


9 thirty


7:00


12:30


6:30

Extra Practice

Worksheet M11
Pages 161-162

Show these times.


2 thirty


3 o'clock


8 thirty

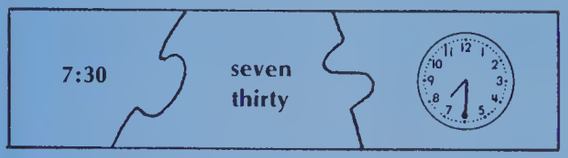

9:30


11:00

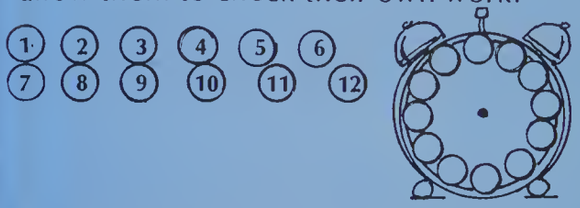

6:30

Reinforcement

1. Let students make telling time puzzles on construction paper. Provide them with a clock face stamp.



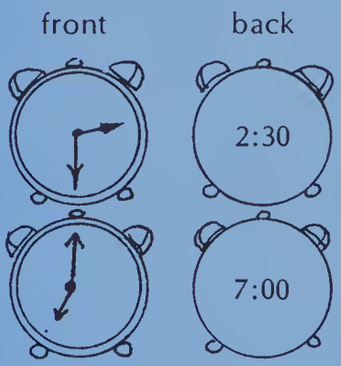
2. Provide bingo chips numbered from 1 to 12 and a large cardboard clock face with missing numerals. Ask the students to number the clock face and allow them to check their own work.



3. Challenge students to construct toy clocks using paper plates, cardboard, and fasteners. Common errors include having similar hand lengths and spacing numerals incorrectly.

Enrichment

Prepare a set of *Mystery Time* work cards. These cards should contain no numerals on the clock face. Students are forced to interpret the missing numerals from the position of the hands.



UNIT 8 LESSON 8

Objective M12

Tell time to five-minute intervals.

Vocabulary

Hours, minutes

Materials

Large numeral cards [1], [2], ... [12]
Demonstration clock
Small clock faces
Minute labels [:05], [:10], [:15], etc.

Introducing the Lesson

On the demonstration clock, show the students the small markings along the rim. Point out that there are 5 spaces between each number. Ask a student to count all the individual spaces aloud. Stress that there are 60 minutes in an hour.

Review counting by 5s to 60. Then give twelve students, seated on the floor, large cards with the numbers [1], [2], ... [12]. Arrange the students in a circle as a clock face. Have each student in turn stand up and call out his or her number of 5s. (*1 five, 2 fives, ...*) as the rest of the class slowly count by 5s (*five, ten, ...*). Repeat this activity with twelve other students. This time have a student move a metre stick, to represent the minute hand, as the numbers are called out.

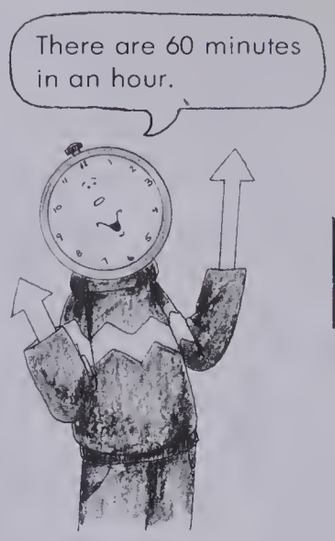
Teaching the Lesson

Move the minute hand on the demonstration clock to each of the numerals as the students count by 5s. Then have the students label the demonstration clock with five-minute interval labels: [:00], [:05], [:10], etc. Remind the students that these labels count the minutes marked along the outer rim of the clock. Set the clock at 8:15. Ask what hour is shown. Ask how many minutes after the hour it is. (*15.*) Show the students how to write it. *8:15* Use visual clues.

[8 : 15] [8 : 15]
hours minutes

Have the students practise reading and writing times to five-minute intervals.

Nome _____





What time is it?


9:10


5:20


3:40


6:05


8:00


10:55

Time to five minutes

one hundred sixty-three 163

Using the Pages

- The counting by 5s pattern should be completed before the other exercises are begun. The telling time exercises on page 163 focus on reading the minute hand.
- On page 164, the counting by 5s pattern may be completed, if required. Both the hour and minute hands must be interpreted. Note the visual clues under the first row.

12	1	2	3	4	5	6	7	8	9	10	11
00	05	10	15	20	25	30	35	40	45	50	55

What time is it?


9:05


5:20


6:05

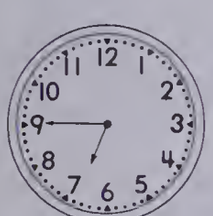

9:00


8:30


3:40


2:50


8:15


6:45


1:05


12:35


5:55

Extra Practice

Worksheet M12
Pages 163-164

Show the times.


3:15


3:45


3:10


3:40


7:15


9:45

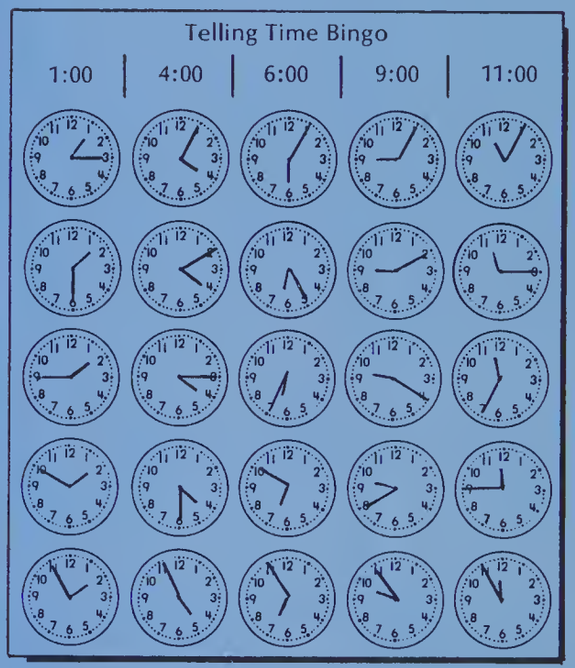

6:05


5:50

Reinforcement

1. *What Time Is It?* For a week, during each period of a school day, suddenly ask, "What time is it?" The students throughout the day who first volunteer may be dismissed for the next recess before the rest of the class.

2. Construct a set of *Telling Time Bingo* cards. On the front show clock faces arranged in columns headed by 1:00, 4:00, 6:00, 9:00, and 11:00. Each clock on the card is set to one of the 12 five-minute marks. The caller draws times from a box and places them on a recording sheet. (To facilitate play, arrange the times on the Bingo cards and recording sheet in ascending order.) The game proceeds as in regular Bingo.



Enrichment

Have students fold in half, four times, large circular pieces of drawing paper so that eight pie sections are formed. In each section, pictures are to be drawn and times indicated for the following daily events.

Time to get up.
School begins.
Lunch ends.
School is over.
We have dinner.
My favourite T.V. show.
My bedtime.
Dreamtime.



UNIT 8 LESSON 9

Objective M13

Order the months of the year, the days of the week, and the hours of the day.

Vocabulary

Date, day, week, month, year, yesterday, today, tomorrow
Direction words: Put each list in order.

Materials

Sets of index cards with: **a.** clock times **b.** months of the year **c.** days of the week

Introducing the Lesson

Have someone print today's date in its common form on the chalkboard, for example, March 13, 1986. Ask the students how to print yesterday's date. Explain that yesterday (March 12th, 1986) we learned how to tell time and today we are going to practise putting times in order. Have someone print tomorrow's date. Another student uses the numerals 1, 2, and 3 to put these dates in order.

Teaching the Lesson

Make the following times on the demonstration clock while a student records them on four index cards: 4:00, 1:00, 7:00, 11:00.

Help the students place these times in order. (Throughout this lesson the cyclical nature of time is ignored. Refer to the Enrichment section if you wish to pursue this topic.) Repeat the ordering activity for the following sets of cards.
2:20, 2:30, 2:15, and 2:45
3:45, 6:15, 6:45, and 3:15

Use a calendar for the year to show how the months are ordered. Have the students place the month cards in order beneath the numerals 1 to 12. Conclude that there are 12 months in a year.

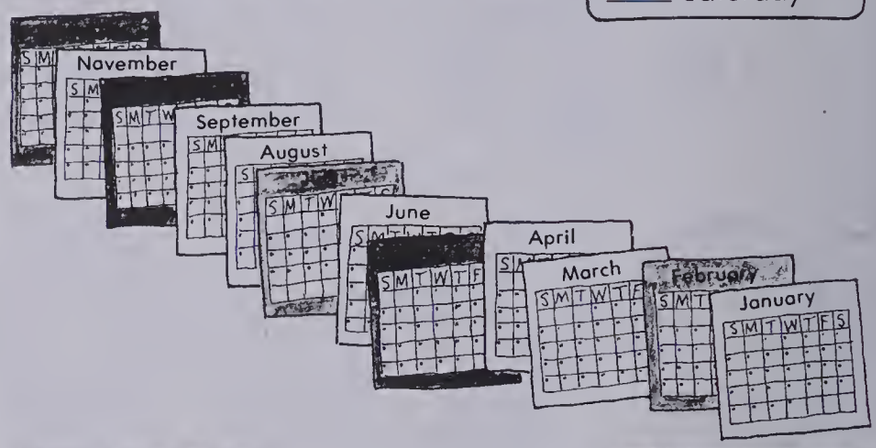
Ask students to recite the days of the week in order. Shuffle the cards with the names of the days of the week and ask a student to place them in order under the numerals 1 to 7. Conclude that there are 7 days in a week.

Name _____

Put each list in order.

3	March	12	December
1	January	9	September
5	May	7	July
2	February	11	November
4	April	10	October
6	June	8	August

3	Tuesday
1	Sunday
5	Thursday
6	Friday
4	Wednesday
2	Monday
7	Saturday



3	5:00	1	2:15	2	6:25
2	3:00	4	5:40	3	8:06
4	6:00	3	5:30	1	6:20
1	2:00	2	2:50	4	8:12

Answers will vary.

Today's date _____

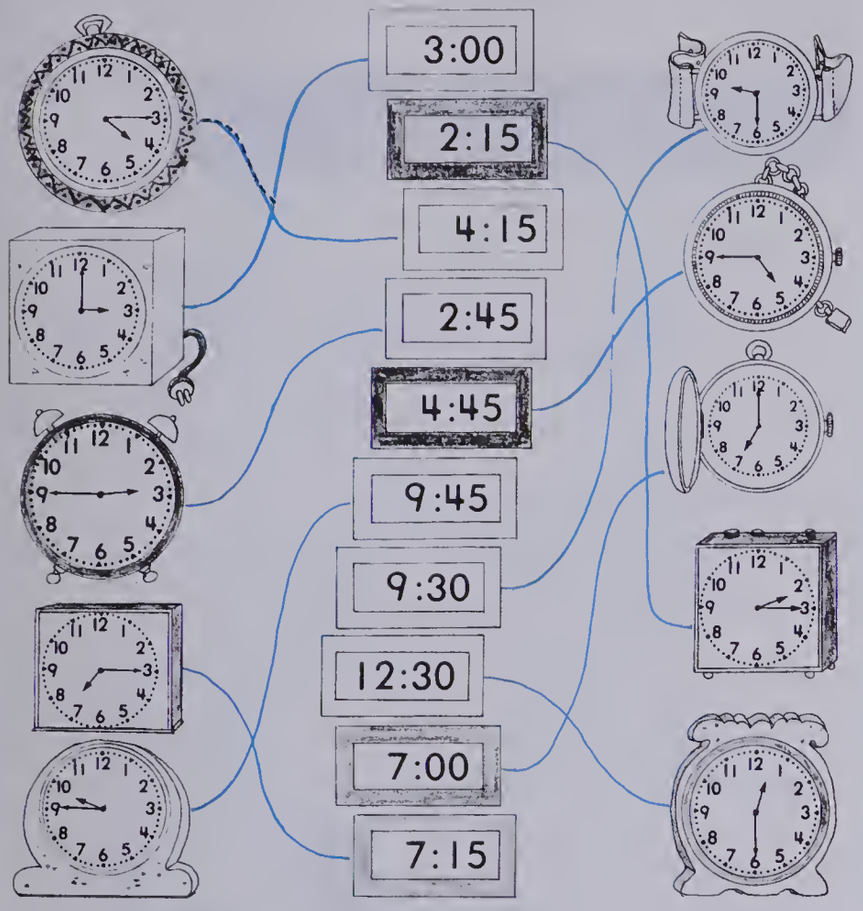
Yesterday's date _____

Tomorrow's date _____

Using the Pages

- You may wish to pursue further activities as found in the Reinforcement section before assigning page 165. Challenge able students to cover up the picture showing the calendar months while ordering the months. They can then check these answers themselves.
- Page 166 reviews telling time with a focus on times ending in :00, :15, :30, and :45.

Match.



LOOKING BACK

Add or subtract.

38	65	98	322	865
+ 21	− 43	− 74	+ 407	− 223
59	22	24	729	642

Extra Practice

Worksheet M13

Pages 165-166

Colour in order.



Start.

January	June	May	June	July
February	March	April	June	August
April	September	March	October	September
June	May	December	November	May

Finish

Reinforcement

1. Require all students to put the date on their written work. During the month, change the form of the date displayed on the chalkboard according to the following pattern.

10 days—regular form:
February 13, 1986
5 days—shortened form: Feb. 13, 1986
5 days—number form: 1986-2-13

2. Prepare dot-to-dot puzzles that incorporate months, days of the week, or times as the ordering task.

Enrichment

1. *Calendar Project* Assist students in the construction of their own calendar. Provide blank calendar worksheets (available in this *Teacher's Resource Book*). Have the students print the months, number the days, and shade the holidays in colour. The calendar can be assembled in booklet form with yarn, staples, or fasteners.

2. Make a *Month Search* for a worksheet or bulletin board. Fill in the blank squares of the answer key with random letters.

		J	A	N	U	A	R	Y	F
A						O			E
U	J			D		C	N		B
G	U			E		T	O		R
U	N	A		C		O	V		U
S	E	P	T	E	M	B	E	R	A
T		R		M	A	E	M		R
		I		B	Y	R	B		Y
J	U	L	Y	E			E		
		M	A	R	C	H	R		

UNIT 8 LESSON 10

Objective PS8

Interpret and construct tables and bar graphs.

Vocabulary

Bar graph, morning, afternoon
Direction words: Complete the bar graph.

Materials

Demonstration clock
Chart paper
Crayons
Rulers

Introducing the Lesson

Set the clock to 5:00. Ask if this time is in the morning or afternoon. Discuss how it could be either. By rotating the hour hand twice through all the numerals, show how the clock measures time between midnight and noon (the morning), and between noon and midnight (the afternoon and evening).

Teaching the Lesson

Copy a table similar to the one below on chart paper. Enter temperatures relevant to your area for this time of the year.

	Morning		Evening	
Time	7:00	11:00	7:00	11:00
Temperature	3°C	8°C	4°C	2°C

Ask these questions.
1. What was the temperature at 7:00 in the evening?
2. What was the temperature at 11:00 in the morning?
3. When was the temperature 3°C?
4. When was it coldest?
5. When was it warmest?

With the students' help, construct a bar graph from the table above. Use a format similar to the one on the bottom of page 167.

Name _____

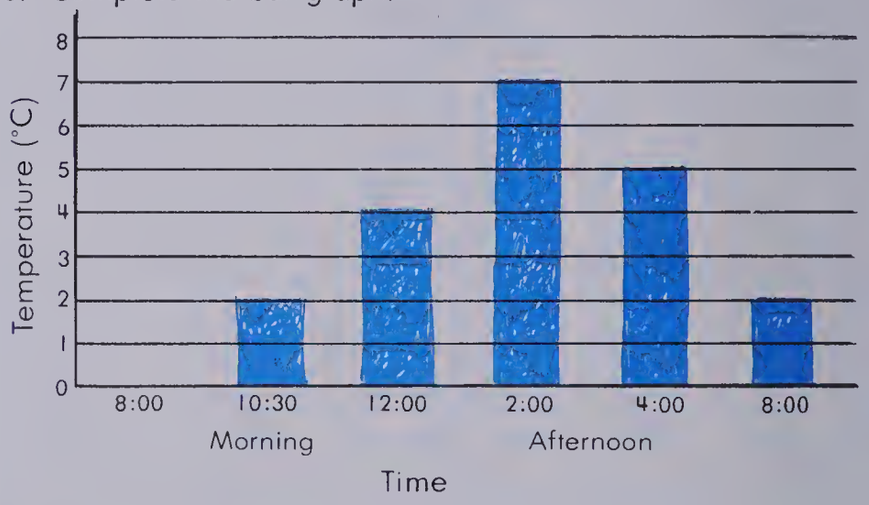
Morning

[redacted]

Afternoon

Time	2:00	4:00	8:00
Temperature	7°C	5°C	2°C

1. What was the temperature at 10:30? 2°C
2. What was the temperature at 8:00 in the morning? 0°C
3. When was it coldest? 8:00
4. When was it warmest? 2:00
5. Complete the bar graph.



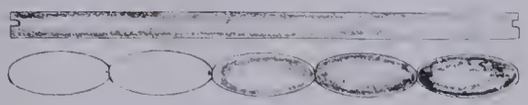
Problem solving: grophs and chorts one hundred sixty-seven 167

Using the Page

- Be prepared to assist some students in reading the questions on page 167. Require the use of rulers for the construction of the bar graph.

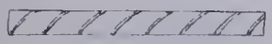
Name _____

How long?



5

10 cm

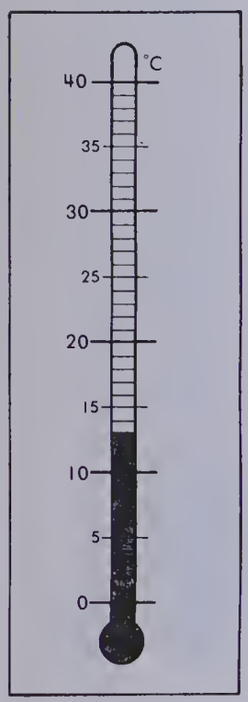


5 cm

one metre

100 cm

How warm is it?

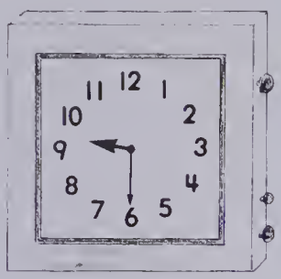


13 °C

What time is it?



5:00



9:30



7:15



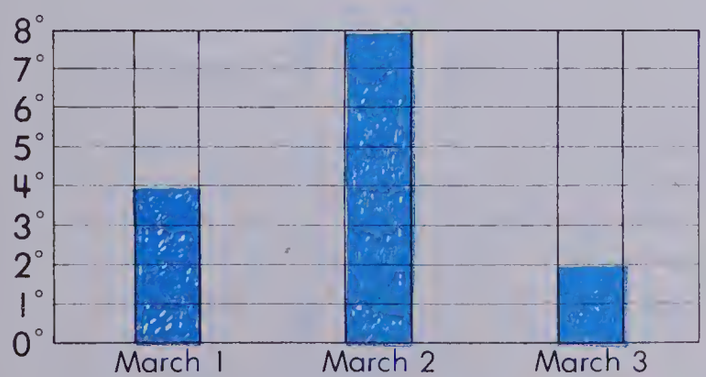
12:45

Extra Practice **Worksheet PS8**

Page 167

Colour the bar graph.

Date	March 1	March 2	March 3
Temperature	4°	8°	2°



UNIT 8 TEST

Part 1: Measure length in nonstandard and standard units.

Part 2: Measure temperature to the nearest degree Celsius.

Part 3: Tell time to the hour, half-hour, and five-minute intervals.

Informal Assessment

For students who seem to have difficulty with the unit test, these assessment items will provide more specific information than would a written test.

1. Use a set of units to measure the length of several objects. "How many blocks long is this shoe?"

2. Estimate length in centimetres and measure with a centimetre ruler. "How many centimetres long is this pencil?"

3. Identify lengths longer than, shorter than, and about one metre. "Which of these are about one metre long?"

4. Read the temperature from a thermometer. "What temperature does this thermometer show?"

5. Tell times to the five-minute interval. "How do you say these times?" (Show on demonstration clock 3:00, 4:30, 5:15, 4:00, 1:30, 12:10, 1:45.)

6. Read the time to the five-minute interval. (Show on demonstration clock 3:00, 4:30, 5:15, 4:00, 1:30, 12:10, 1:45.)

7. Place the days of the week and the months in order.

UNIT 9
Addition and Subtraction to 18

Theme: Transportation

Lesson		Objective	Pages
1	A28	Add and subtract with sums to 12.	169-170
2	A29	Add, with sums to 13.	171-172
3	A30	Subtract, with minuends to 13.	173-174
4	A31	Add, with sums to 14.	175-176
5	A32	Subtract, with minuends to 14.	177-178
6	A33	Add, with sums to 15.	179-180
7	A34	Subtract, with minuends to 15.	181-182
8	A35	Add, with sums to 18.	183-184
9	A36	Subtract, with minuends to 18.	185-186
10	A37	Add doubles with speed and accuracy; add doubles plus one.	187-188
11	PS9	Add and subtract mixed questions; solve simple word problems to sums of 18.	189-190
12	PS10	Solve comparison, subtraction word problems.	191
Test		Addition and subtraction to 18	192

Vocabulary

sum
equal
separate
subtract
whole
part
find the ten
doubles
addition table
compare
less
addition names
addition sentence
subtraction names
subtraction sentence
related fact
related sentence
number family
doubles plus one
story problems
more

Printed Directions:

Look for number family triangles.
Write 4 number sentences for this number family.
Use addition facts to help you subtract.
Add and colour to find the path to the treasure.

Materials

Addition Name Cards (sums to 18):

9 + 8

Subtraction Name Cards (minuends to 18):

15 – 6

Numeral Cards: 0 to 18

Ten frames (10 cm × 20 cm)



Blank addition table worksheets

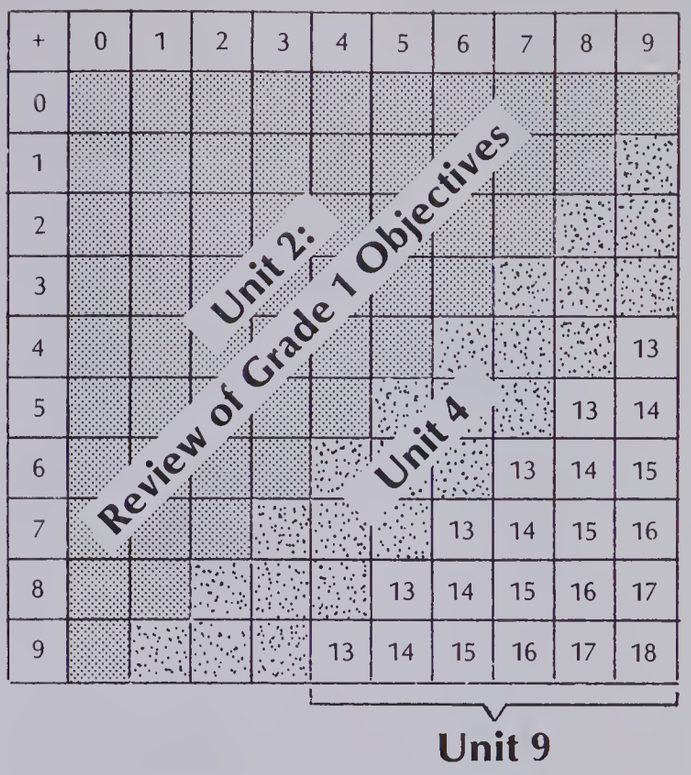
+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										

chart paper
poster paper
graph paper
paper plates
blank cards
interlocking cubes
dice
timer
crayons
wooden blocks
counters
"gold" coins
stickers
toy card
blank dice
Cuisenaire rods

About This Unit

Unit 9 covers all the remaining basic addition and subtraction facts to sums of 18. Sums to 12 were covered in Unit 4, which leaves 21 addition and 21 subtraction facts for this unit.

The following chart illustrates the 100 basic fact combinations. (For subtraction facts use the inverse combinations.)



The initial approach used to organize each lesson is to group facts according to sums and to focus on the various addition names for the numbers 13 to 18. Only single-digit addends are included in the basic facts. This means that, although there are many combinations that add to 18, only one needs to be memorized, e.g., 9 + 9 = 18. The other addition names can be computed using place value, e.g., "Add the ones. Add the tens."

$$\begin{array}{r} 14 \\ +\ 4 \\ \hline \end{array} \qquad \begin{array}{r} 16 \\ +\ 2 \\ \hline \end{array}$$

Following the introduction of addition names, succeeding lessons use these names to determine differences in the inverse subtraction facts. In order to minimize the number of facts requiring memorization, emphasis is placed on number families (using known addition names) and relating them to subtraction.

Number family: 9, 5, 14

9 + 5 = 14

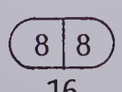
5 + 9 = 14

14 – 9 = 5

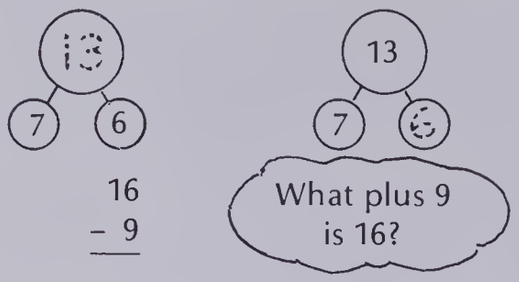
14 – 5 = 9

Using known facts:

8 + 8 = 16, so 16 – 8 must be ____



Relating addition and subtraction:



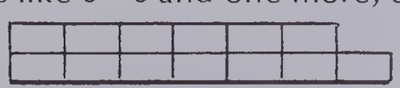
Studies of how students acquire recall of basic facts show that they usually follow this sequence.

1. Counting one by one, usually using counters as aids.
2. Counting on from one addend.
 6 + 8 = *six, seven, eight, nine, ten, eleven, twelve, thirteen, fourteen,* 6 + 8 = 14
3. Counting on from the greater addend.
4. Reasoning by grouping numbers, e.g., 5 + 7 = 5 + 5 (+ 2 more); or by using known facts, e.g., 6 + 7 = 6 + 6 (+ 1 more).
5. Recall (habitual response).

Embedded in each lesson are several strategies or approaches to teaching and learning addition facts and their inverse subtraction combinations. Research shows that it is important to provide students with a variety of reasoning methods to help them organize number facts into a pattern that is meaningful to them. You will probably find that not all students will grasp and use all of the methods listed below. Do not be concerned if a method does not make sense to some students. These methods are the means to an end, not ends in themselves. Since different students think in different ways about basic facts, you are simply providing them with alternatives.

Some thinking strategies for grouping basic fact combinations are as follows.

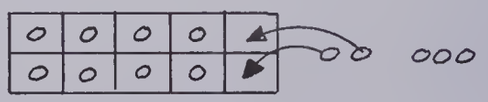
1. Doubles
 These combinations (4 + 4, 9 + 9, etc.) appear to be the easiest for most pupils to commit to memory. Lesson activities throughout the unit (Lesson 10 in particular) focus on developing speed and accuracy with doubles.
2. Doubles plus one
 These combinations (3 + 4, 7 + 6, 8 + 9, etc.) involve a reasoning procedure of thinking of a related double and adding one more.
 6 + 7 is like 6 + 6 and one more, or 12 + 1



3. Adding 10, adding 9
 Even though the basic facts do not include + 10 examples, first teaching 4 + 10 can facilitate the later learning of 4 + 9. This pattern is extended to provide a rule for adding 9.



4. Finding a ten
 If students can think easily of a combination for ten, basic facts such as 8 + 5 can be thought of as (8 + 2) + 3, or 10 + 3. Ten frames are used to develop this pattern.



Ask the students how they can help themselves remember a combination. Your students may use much more unique and effective patterns than the methods that have been presented! All methods should receive credit and respect. The methods students are developing now as they reason and "problem solve" with numbers are of far more long-term value than speed of recall at this stage.

Ideas

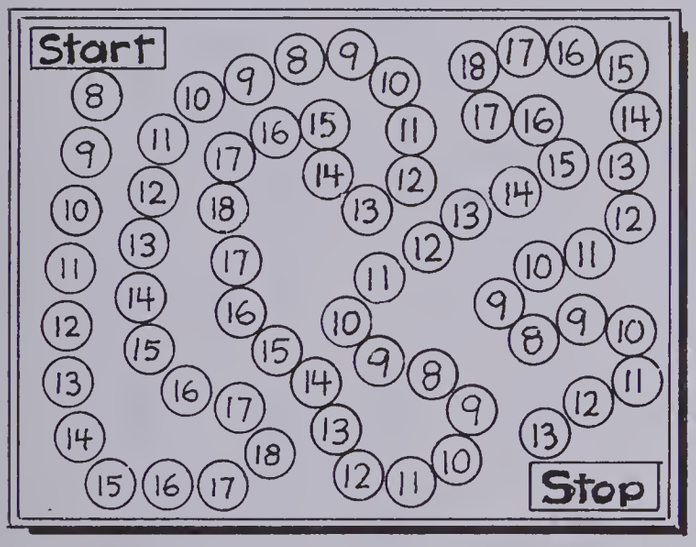
1. The theme of Unit 9 is *Transportation*. This provides for easy integration with Social Studies, Science, Art, and Language Arts. These ideas might be employed.
 a. Make a graph to show how many students have been on a train, plane, ship, boat, helicopter, sea plane, ferry, sail boat, canoe, etc.
 b. Write stories about these trips.
 c. Make a mural showing different kinds of planes, boats, etc.
 d. Collect old trinkets, baggage tags, travel mementos, etc. Write labels or paragraphs to describe each.
 e. Use the time of day printed on tickets or schedules to extend Unit 8's telling-time skills to include the 24 hour clock.
 f. Plan imaginary trips. Look up distances. Make a chart to show distances in kilometres. Use the chart for comparing two- and three-digit numbers.
 g. Send for travel brochures. Display these with printed descriptions.

h. Cut out pictures of vehicles. Back them with stiff cards. Use the pictures for sorting and discussing similarities and differences between vehicles:
wheels/no wheels
number of wheels
size
engine/no engine
fly/float

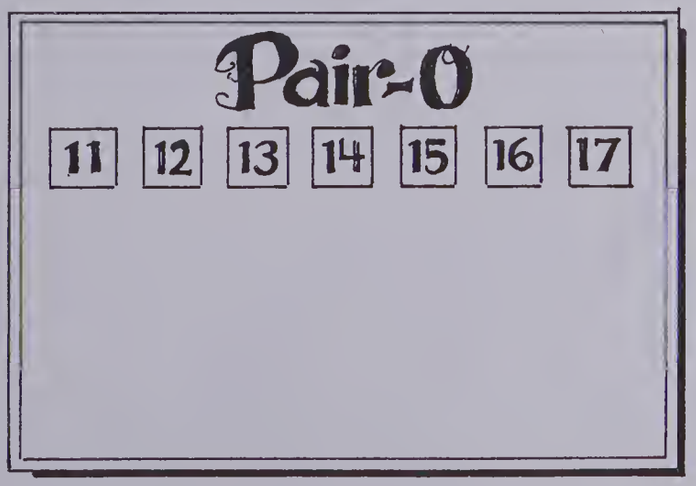
i. Design space vehicles. Draw or model them.

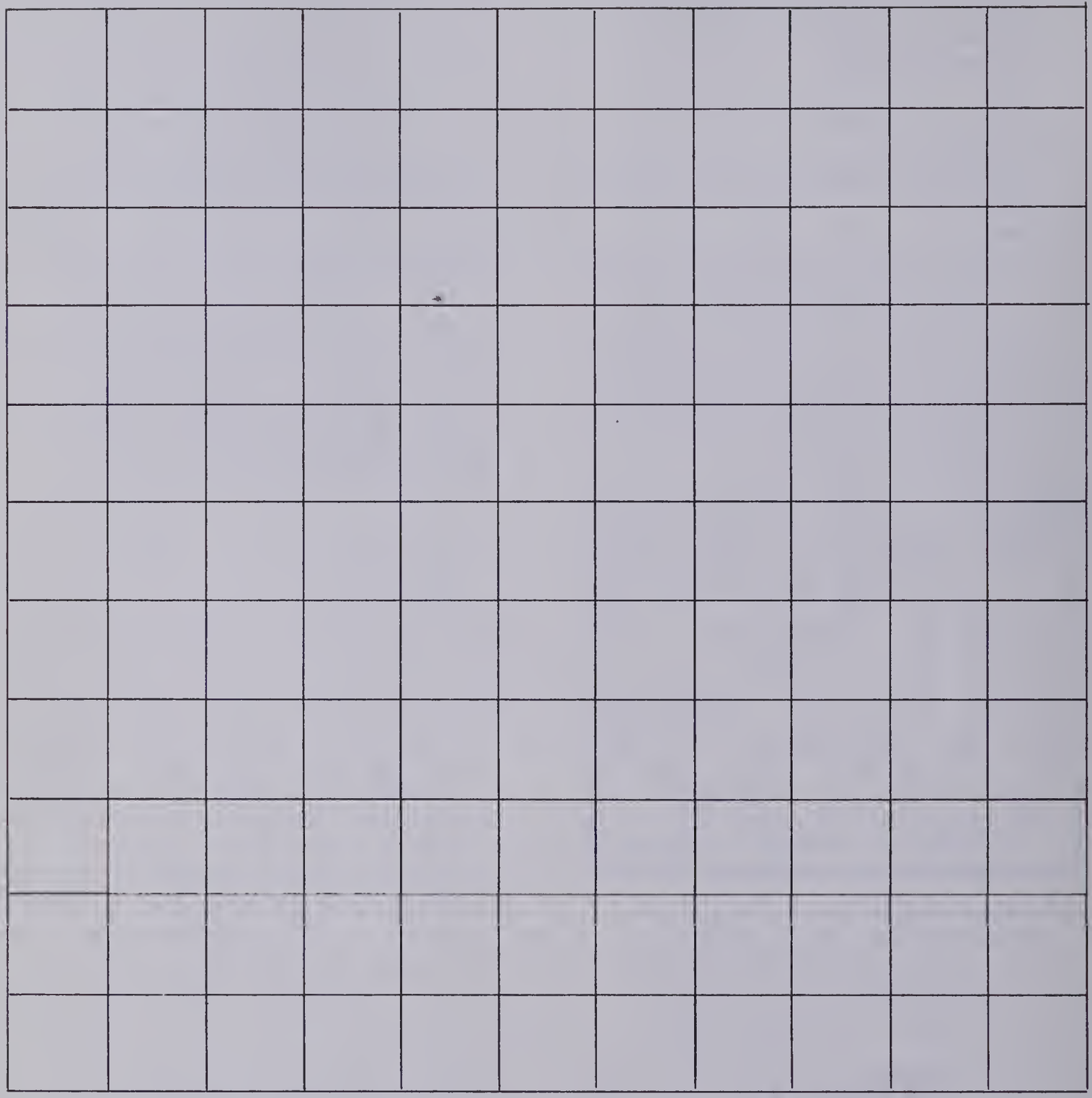
2. Games

a. Prepare a game board with a path of the numbers between 8 and 18 in sequence or mixed. Players take turns rolling two dice (marked 4, 5, 6, 7, 8, 9), determining the sums, and moving to the first space ahead showing that sum. The first player to reach Stop wins. An incorrect sum means a missed turn.



b. Prepare a *Pair-O* game board as shown below and a deck of 38 cards having the numbers from 2 to 9 in these amounts: one 2, two 3s, three 4s, four 5s, six 6s, seven 7s, eight 8s, and seven 9s. Five cards are dealt to each player and the remainder of the deck is placed face down on the game board. The first player lays a card under one number on the game board and draws another card from the deck. Since the object of the game is to have the most *pairs*, the second player may (if he has a match) lay a card under the first player's card and make a *pair*. (The sum of the numbers on the cards equals the game board number.) The player then collects the pair, takes another turn, and draws a card from the deck. At all times, players must have 5 cards in their hands. A player can make as many pairs as possible during a turn. If a player is unable to make a pair, the card is laid under another game board number. The game is over when all the cards have been used. The player with the most pairs wins.





Name _____

Pretest **Unit 9**

Add.

9 + 9 = 18	8 + 6 = 14	8 + 5 = 13	7 + 8 = 15	8 + 8 = 16	9 + 7 = 16

Subtract.

15 − 8 = 7	13 − 6 = 7	14 − 5 = 9	17 − 8 = 9	16 − 9 = 7	18 − 9 = 9

Add or subtract.

7 + 7 = 14	9 + 4 = 13	16 − 7 = 9	8 + 9 = 17	15 − 8 = 7	17 − 9 = 8

7 
9

How many in all?

16 in all.

Randy made 8 ⬢
Joe made 13 ⬢
Who made more? Joe
How many more? 5

17 
9 

How many are left?

8 are left.

Print four number sentences using 15, 8, and 7.

8+7=15
7+8=15
15−8=7
15−7=8

Name _____

Post-test **Unit 9**

Add.

6 + 8 = 14	8 + 9 = 17	7 + 6 = 13	9 + 9 = 18	8 + 7 = 15	9 + 6 = 15

Subtract.

14 − 5 = 9	18 − 9 = 9	16 − 7 = 9	15 − 8 = 7	17 − 9 = 8	14 − 6 = 8

Add or subtract.

6 + 9 = 15	14 − 8 = 6	17 − 8 = 9	8 + 8 = 16	18 − 9 = 9	7 + 7 = 14

8 
9

How many in all?

17 in all.

Sam has 6 
Pat has 15 
Who has more? Pat
How many more? 9

15 
7 

How many are left?

8 are left.

Print four number sentences using 16, 9, and 7

9+7=16
7+9=16
16−9=7
16−7=9

UNIT 9 LESSON 1

Objective A28

Add and subtract with sums to 12.

Vocabulary

Addition names, subtraction names, addition sentences, subtraction sentences

Materials

Addition Name Cards (sums from 7 to 12)
Numeral Cards 0 to 12
Poster board for a chart
Crayons

Introducing the Lesson

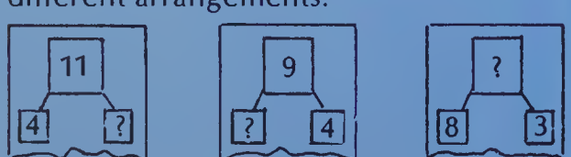
Draw six train cars labelled 7, 8, 9, 10, 11, 12 on the chalkboard. Distribute Addition Name Cards with sums from 7 to 12 (51 in all) as train tickets. Ask for students holding tickets for car number 10 to stand, and so on. Other students check the addition names of the standing students to ensure that the responses are correct. Repeat several times, switching cards after every few calls. Finish by calling in the tickets for each car.

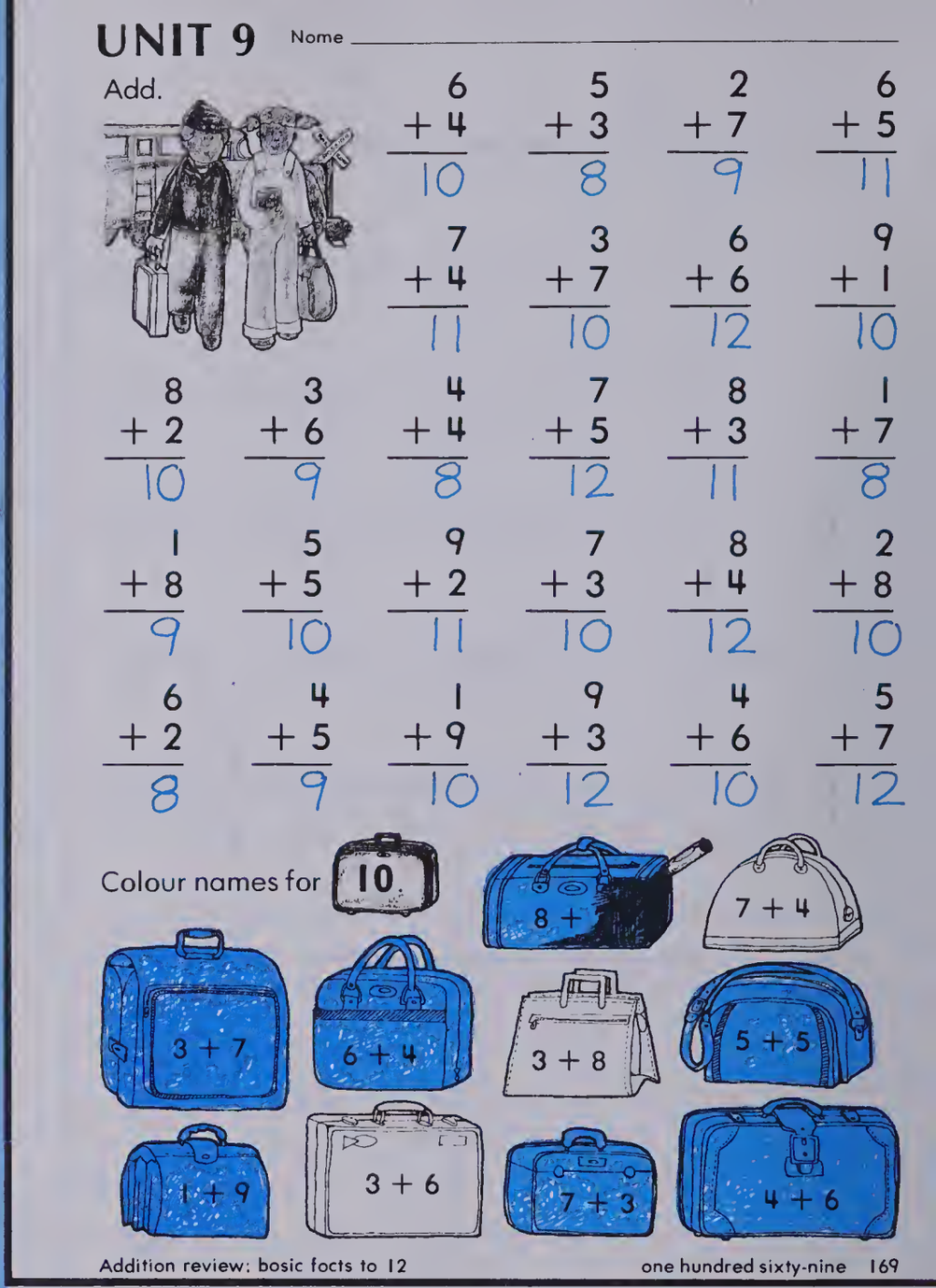
Teaching the Lesson

Review sums to ten. (These sums are to be used as the basis for determining higher sums in future lessons.) Say a number from 0 to 10 and see how quickly students can think of an addend that will yield a sum of ten. "Three." *Seven.* "Five." *Five.*

Review the doubles from 0 + 0 to 6 + 6. Flash the doubles cards, trying for instant recall.

Review related addition and subtraction sentences using a pocket chart and the numeral cards from 0 to 12. For example, put 4 and 7 in the small squares and ask for the sum. Place 11 in the big square. Show how the two parts make the sum and how subtraction starts with the whole, or sum, and subtracts a part. Try several different arrangements.

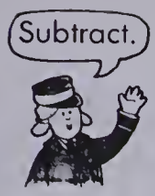




Using the Pages

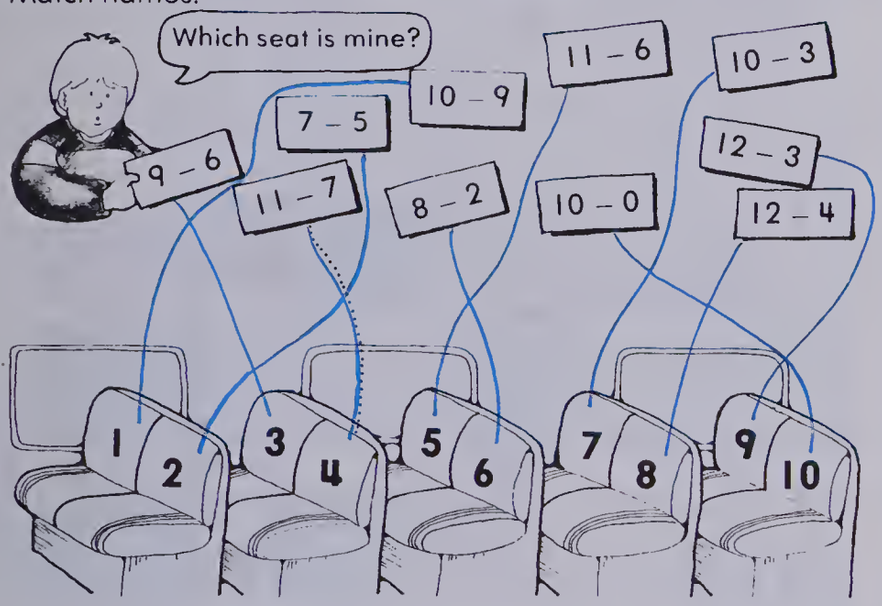
- The additions at the top of page 169 review sums to 12. Students must colour names for 10 at the bottom of the page.
- The subtractions at the top of page 170 review differences using minuends to 12. At the bottom of the page, students must match subtraction names to the corresponding seat number.

Subtract.



6 − 2 = 4	8 − 4 = 4	10 − 8 = 2	9 − 5 = 4	12 − 6 = 6	
10 − 7 = 3	8 − 2 = 6	10 − 6 = 4	7 − 5 = 2	11 − 3 = 8	9 − 6 = 3
11 − 7 = 4	10 − 3 = 7	8 − 7 = 1	10 − 5 = 5	12 − 8 = 4	11 − 6 = 5
12 − 5 = 7	7 − 3 = 4	9 − 7 = 2	11 − 5 = 6	10 − 1 = 9	12 − 3 = 9

Match names.



Extra Practice **Worksheet A28**
Pages 169-170

Add.

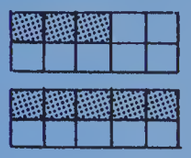
9 + 3 = 12	1 + 8 = 9	4 + 6 = 10
5 + 5 = 10	3 + 7 = 10	5 + 6 = 11
2 + 7 = 9	6 + 6 = 12	4 + 7 = 11

Subtract.

12 − 4 = 8	10 − 2 = 8	7 − 4 = 3
8 − 5 = 3	11 − 9 = 2	12 − 9 = 3
10 − 1 = 9	7 − 7 = 0	11 − 3 = 8

Reinforcement

1. Have the students place blocks on a ten frame and then record the number of full and empty spaces in an addition name. Repeat until as many names as possible have been recorded.



3 + 7

5 + 5

2. Provide the Addition Name Cards and paper train cars (as described in Introducing the Lesson) for the students to sort on their own or in a small group.

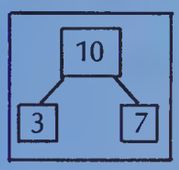
3. Print the following subtractions on the chalkboard. Ask the students to show how to use addition names to help with subtraction.

12 − 4	8 − 2	10 − 5
11 − 3	9 − 6	10 − 3

Say, "What goes with 4 to make 12 in all?" Record the related sentences: 4 + 8 = 12, 12 − 4 = 8, and 12 − 8 = 4.

Enrichment

1. Provide the three-part pocket chart from Teaching the Lesson and Numeral Cards. Have the students find a sum and then record three other related sentences.



3 + 7 = 10 10 − 3 = 7
7 + 3 = 10 10 − 7 = 3

2. Expand on the train travel theme by:
a. discussing train trips, types of trains, etc.
b. collecting or drawing pictures of trains.
c. having students bring model trains to school for display.
d. making a map to show where various students have travelled (or would like to travel) by train.
e. displaying posters or brochures about train travel in Canada.
f. showing the possible train routes on a map from your community to other parts of Canada.

UNIT 9 LESSON 2

Objective A29

Add, with sums to 13.

Vocabulary

Addition names for 13.

Materials

Wooden blocks
Graph paper
Crayons

Introducing the Lesson

This lesson introduces six new addition facts as names for 13: 6 + 7, 7 + 6, 5 + 8, 8 + 5, 4 + 9, and 9 + 4.

Put out 13 blocks. In turn, have the students come up and separate the blocks into two subsets and record these subsets as an addition.



$$\begin{array}{r} 6 \\ +7 \\ \hline 13 \end{array} \qquad \begin{array}{r} 7 \\ +6 \\ \hline 13 \end{array}$$



$$\begin{array}{r} 3 \\ +10 \\ \hline 13 \end{array} \qquad \begin{array}{r} 10 \\ +\ 3 \\ \hline 13 \end{array}$$

Once all possible arrangements (including 10 + 3, 11 + 2, 12 + 1, and 13 + 0) have been recorded, point out that we can use place value to add the facts having two digits.

$$\begin{array}{r} 11 \\ +\ 2 \\ \hline 13 \end{array}$$

"Add the ones." 1 + 2 = 3
"Add the tens." 1 + 0 = 1

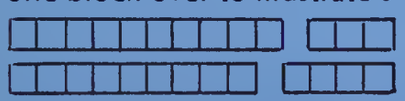
Focus more attention on the one-digit pairs of addends that add to 13. These must be memorized.

Teaching the Lesson

Associate 6 + 7 and 7 + 6 with the known fact, 6 + 6 = 12. Have the students colour graph paper (or use blocks) to illustrate this association.

6 + 6 + 1 = 13 

For 9 + 4 and 4 + 9, show the students with blocks that 10 + 3 = 13. Then move one block over to illustrate 9 + 4.



10 + 3
9 + 4

Have the students verbalize this relationship as they model it with blocks or graph paper. For 8 + 5 and 5 + 8, use the same procedure.

Name _____

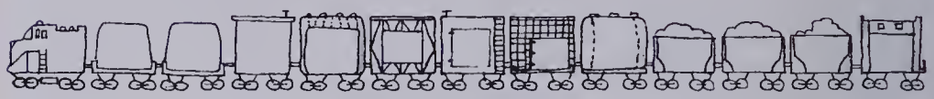
Print names for 13.



6 + 7 = 13 7 + 6 = 13



5 + 8 = 13 8 + 5 = 13



4 + 9 = 13 9 + 4 = 13

Add.

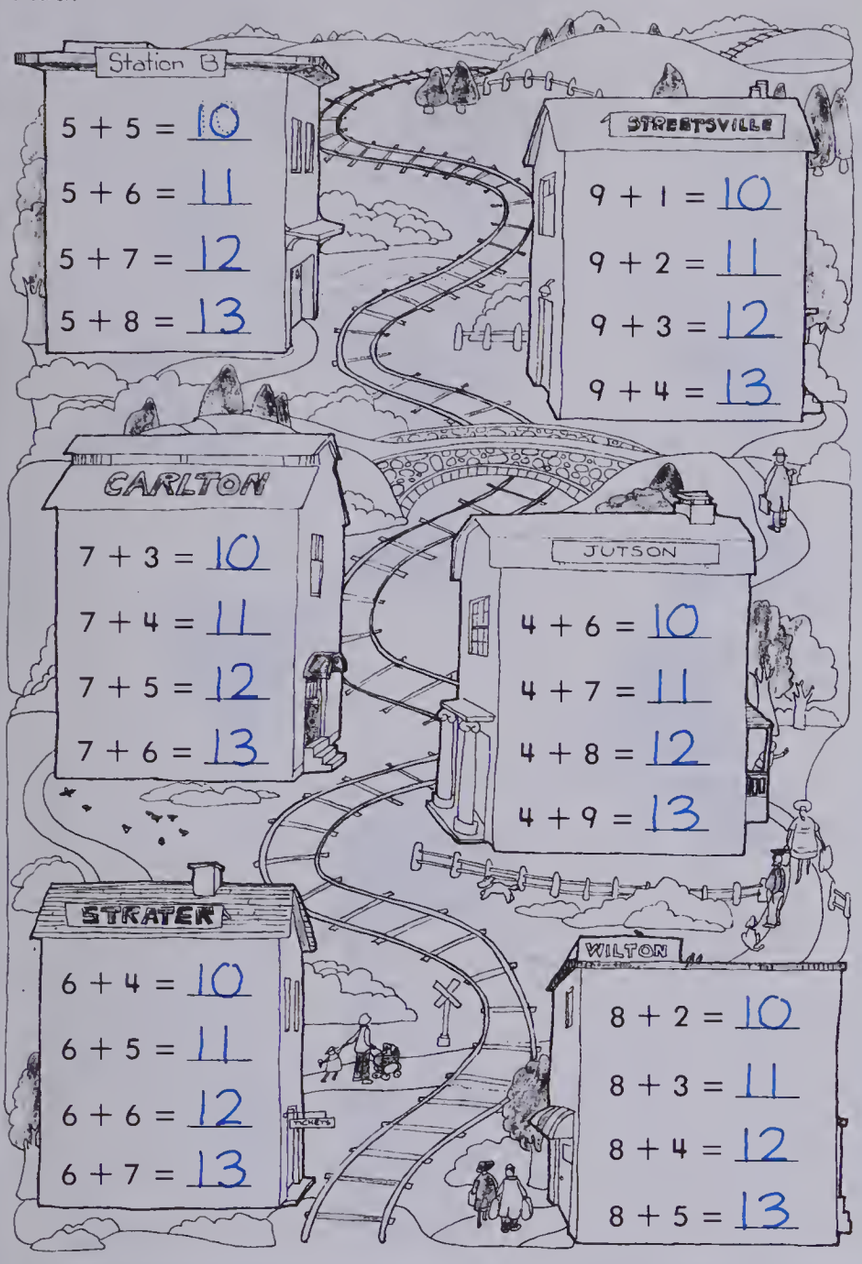
6 + 7 = 13 5 + 8 = 13 7 + 4 = 11
8 + 2 = 10 4 + 9 = 13 6 + 7 = 13
5 + 6 = 11 7 + 3 = 10 7 + 5 = 12
8 + 5 = 13 4 + 8 = 12 5 + 5 = 10
9 + 4 = 13 7 + 6 = 13 9 + 3 = 12
6 + 6 = 12 8 + 3 = 11 8 + 5 = 13

Add to 13 one hundred seventy-one 171

Using the Pages

- Interpret the train illustrations on page 171 as a class to get the six new names for 13. Assign the exercise at the bottom of the page for independent work.
- Do one pattern on page 172 together to remind the students of the Reinforcement activity of patterning.

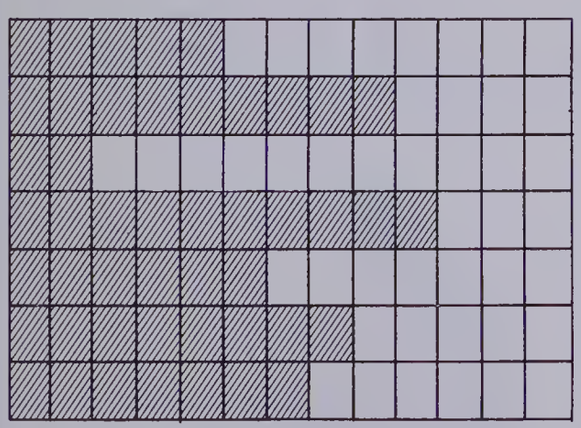
Add.



Extra Practice

Worksheet A29
Pages 171-172

Print names for 13.



5 + 8 = 13
9 + 4 = 13
2 + 11 = 13
10 + 3 = 13
6 + 7 = 13
8 + 5 = 13
7 + 6 = 13

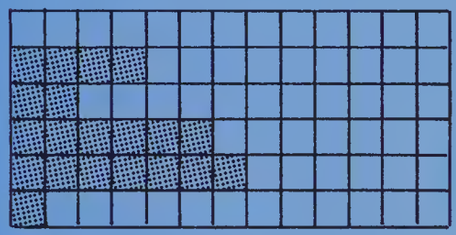
Reinforcement

1. Record the following pattern on the chalkboard for the students to model with blocks or graph paper.
5 + 5 = 10, 5 + 6 = ?, 5 + 7 = ?, 5 + 8 = ?
Try this pattern also:
9 + 1 = 10, 9 + 2 = ?, 9 + 3 = ?, 9 + 4 = ?

2. Have the students see how quickly they can find and circle addition names for 13. There are ten altogether. Check the answers orally.

6 + 7	7 + 5	7 + 6	8 + 5
6 + 6	4 + 9	9 + 2	8 + 4
8 + 5	6 + 5	5 + 8	3 + 8
4 + 9	7 + 6	4 + 4	2 + 7
5 + 6	9 + 4	1 + 8	6 + 7

3. Ask the students to shade in two-colour patterns for 13 using graph paper and crayons. Then have them record the names for 13. They should try to make all possible combinations. Have them star the six names that must be remembered.

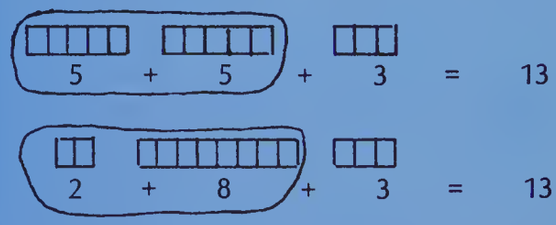


0 + 13
4 + 9 ★
2 + 11
6 + 7 ★
7 + 6 ★
1 + 12

4. Give each student the numeral cards: [11], [12], and [13]. Call out names for these numbers. Have the students hold up the card that names the sum.

Enrichment

Have the students look for subsets that equal 10 in sets of 13 blocks.



UNIT 9 LESSON 3

Objective A30

Subtract, with minuends to 13.

Vocabulary

Separate, subtract, number families, related number sentences
Direction words: Look for number family triangles.
Write 4 number sentences for this number family.

Materials

Wooden blocks
Numeral Cards to 13

Introducing the Lesson

Place 13 blocks on a table. Count them with the students. Ask the students to suggest an addition name for 13 and then separate the blocks to illustrate the name. Then the name should be recorded. Cover one subset with a box; ask, "If I have 13 and I cover 5, how many are left?" *Eight, because eight plus five is thirteen in all.*

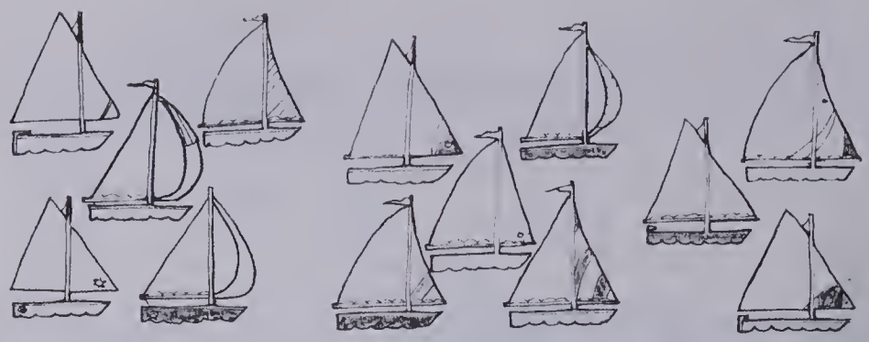
Record the subtraction sentence: 13 – 5 = 8. Point out that if you start with 13 and subtract 5, there are 8 left. Repeat using other names for 13.

Teaching the Lesson

Show 13 blocks. Separate blocks from the group and have the students, in turn, record the subtraction sentences that illustrate the following patterns.

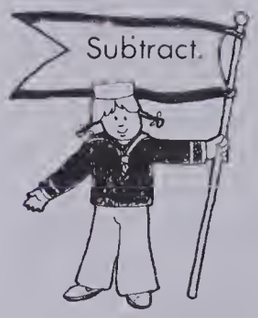
13 – 4 =	13 – 6 =
12 – 4 =	12 – 6 =
11 – 4 =	11 – 6 =
10 – 4 =	10 – 6 =

Review number families using Numeral Cards. Choose a number family such as 3, 7, and 10. Ask a student to make two addition sentences with the cards. Ask another student to record two related subtraction sentences.



Name _____

13 – 6 = 7 13 – 7 = 6
13 – 4 = 9 13 – 9 = 4
13 – 8 = 5 13 – 5 = 8



13 – 6 = 7 13 – 7 = 6
12 – 6 = 6 12 – 7 = 5
13 – 9 = 4 11 – 7 = 4
12 – 9 = 3 10 – 7 = 3
13 – 5 = 8 13 – 4 = 9 11 – 3 = 8
12 – 5 = 7 12 – 4 = 8 12 – 3 = 9
11 – 5 = 6 13 – 8 = 5 10 – 6 = 4
10 – 5 = 5 12 – 8 = 4 11 – 6 = 5

Subtraction facts to 13 one hundred seventy-three 173

Using the Pages

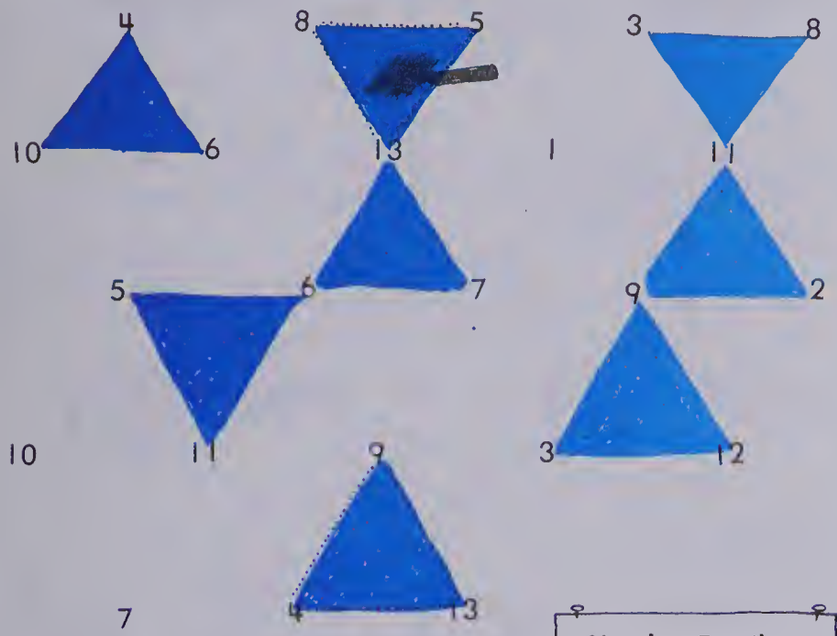
- For page 173, suggest the students think of an addition name to help them subtract. Students who require a visual model can use the 13 sail boats at the top of the page for partitioning and counting remaining subsets.
- Work on page 174 must be preceded by the suggested Reinforcement activities. Less able students may need help finding the families.

Number Family
8 + 5 = 13
5 + 8 = 13
13 − 8 = 5
13 − 5 = 8





Look for number family triangles. Can you find seven more?



Write 4 number sentences for this number family.



Number Family
4 + 9 = 13
9 + 4 = 13
13 − 4 = 9
13 − 9 = 4

Extra Practice **Worksheet A30**
Pages 173-174

Write 4 number sentences for each number family.

6, 7, 13

6 + 7 = 13
7 + 6 = 13
13 − 6 = 7
13 − 7 = 6

8, 5, 13

8 + 5 = 13
5 + 8 = 13
13 − 8 = 5
13 − 5 = 8

7, 5, 12

7 + 5 = 12
5 + 7 = 12
12 − 5 = 7
12 − 7 = 5

Reinforcement

1. Write the following arrangement of numbers on the chalkboard. Join 6, 2, and 8 with straight lines to form a triangle. Explain that the triangle makes a number family: 6 + 2 = 8, 2 + 6 = 8, 8 − 6 = 2, 8 − 2 = 6. Ask the students to find other such families in this arrangement.

5 6 2 7 4
3 8 4 11
1 2 5 9 3

Ask the students to record the number families for each triangle at the chalkboard or on paper.

2. Have students use a ruler to join one number from each of the two rows to make a sum of 13.

0 1 2 3 4 5 6 7 8 9 10 11 12 13
• • • • • • • • • • • • • •

0 1 2 3 4 5 6 7 8 9 10 11 12 13
• • • • • • • • • • • • • •

Enrichment

1. Have the students mix the Numeral Cards (0 to 13) and lay them out face up. They then use any sequence of three cards that is a number family to record the four related number sentences.

4 9 3 2 8 10 2 + 8 = 10 10 − 8 = 2
8 + 2 = 10 10 − 2 = 8

Mix the cards and lay them out several times. How often does no number family come up?

2. Have the students play Concentration with thirteen Numeral Cards. Turn over three cards each time and look for number families.

3. Expand on the boat transportation theme by drawing or collecting pictures of different types of boats. Discuss the uses of boats, kinds of boats, means of making boats move, etc. Have the students tell or write about boat trips they have taken.

UNIT 9 LESSON 4

Objective A31

Add, with sums to 14.

Vocabulary

Equal, addition sentence, find the ten

Materials

Counters
Ten frames
Crayons



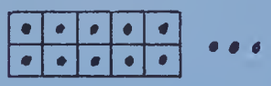
Introducing the Lesson

Provide each student with 14 counters. Have them separate the counters into two equal piles. Ask for the addition sentence named by the piles.
7 + 7 = 14

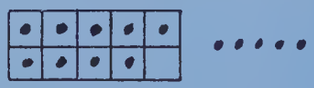
Next, have the students move one counter to the other pile. Ask for the names for 14: (6 + 8, 8 + 6). Continue moving one counter over and recording the pair of names for the arrangement. Once all names have been listed, indicate the five names for 14 that must be learned: 7 + 7, 6 + 8, 8 + 6, 9 + 5, and 5 + 9.

Teaching the Lesson

Provide each student with 15 to 20 counters and a ten frame which has been mounted on stiff card. Ask the students to fill the ten frame with ten counters, add three, and record:
10 + 3 = 13.



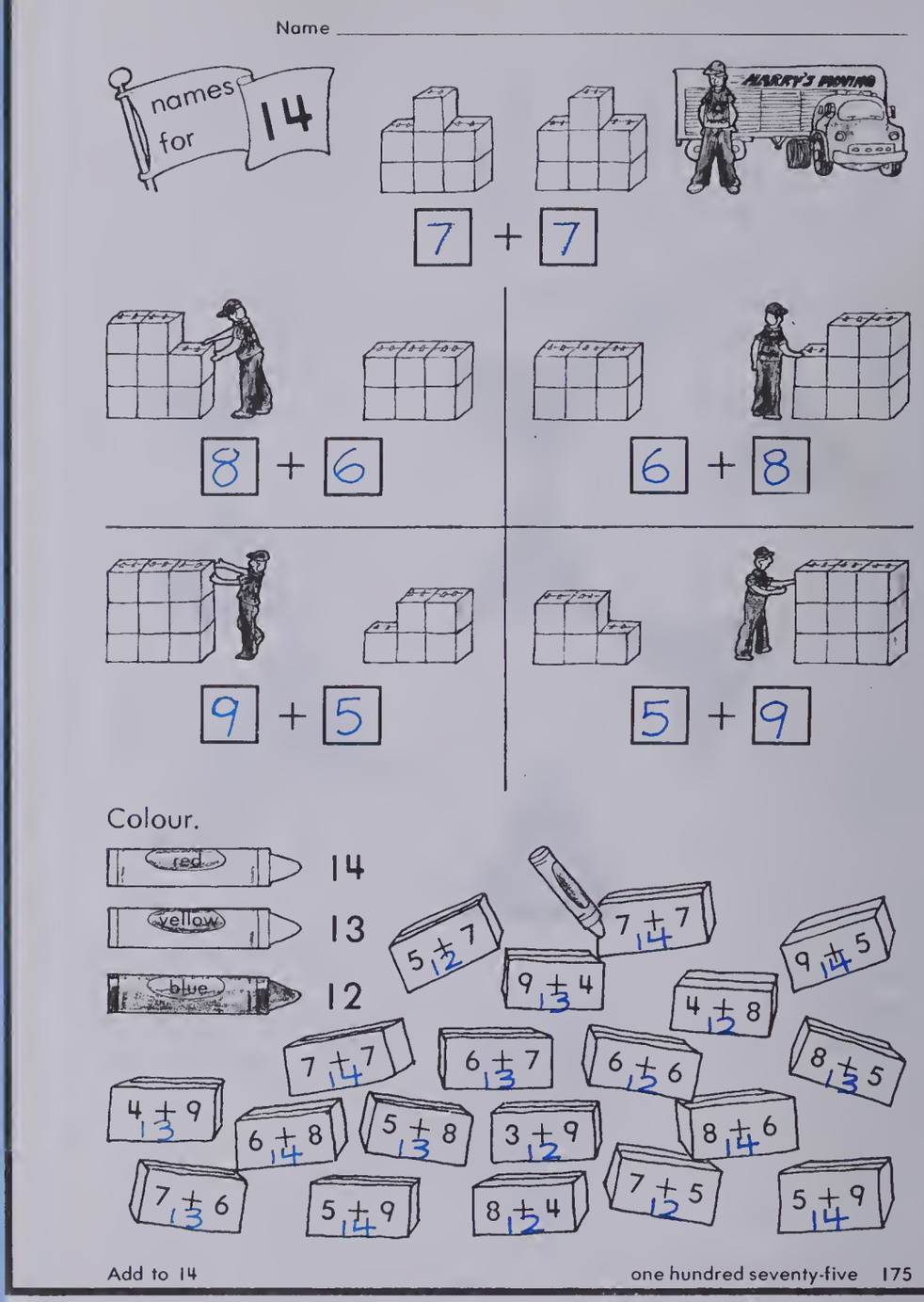
Repeat with 10 + 2, 10 + 5, 10 + 1, etc. Emphasize how easy it is to find sums if you start with 10. Now ask the students to show 9 + 5.



Have them change 9 + 5 to 10 + 4. Record the sum for 9 + 5 and 10 + 4. Repeat, with 9 + 3, and 10 + 2; 8 + 4 and 10 + 2; 9 + 4 and 10 + 3; 8 + 6 and 10 + 4.

Display the following on the chalkboard. Have a student loop a set of ten and tell how many tens and ones are in the sum.

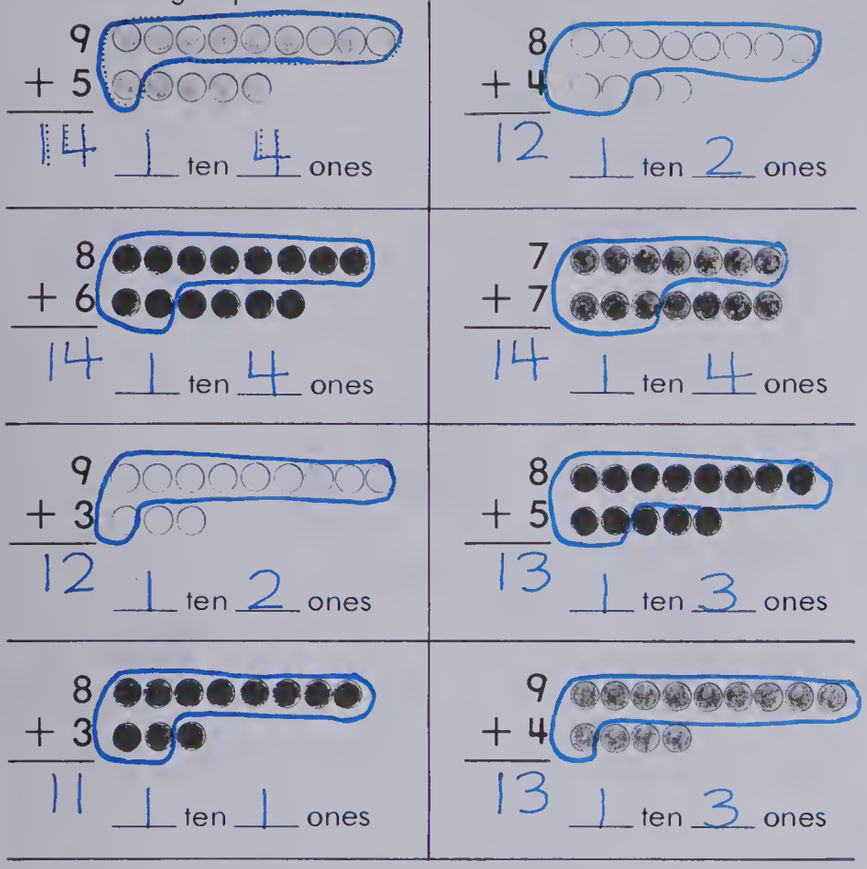




Using the Pages

- On page 175, the students record names for 14 to match the illustrations. Crayons are required for the exercise at the bottom of the page.
- On page 176, the students find a group of ten to help find the sums, as was done in the lesson.

Add. Find a group of ten.



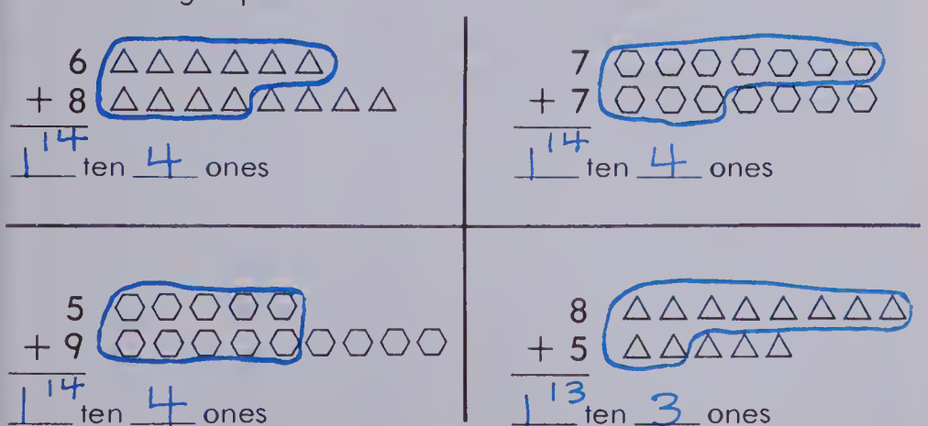
Add.

9 + 2 = 11	5 + 9 = 14	9 + 4 = 13	9 + 5 = 14	9 + 3 = 12	4 + 9 = 13
6 + 8 = 14	5 + 8 = 13	4 + 8 = 12	8 + 5 = 13	7 + 7 = 14	8 + 6 = 14

Extra Practice

Worksheet A31
Pages 175-176

Add. Find a group of ten.



Reinforcement

1. Have the students find a ten to name the sum.

a. 7 + 7

b. 8 + 5

c. 9 + 3

d. 8 + 6

e. 9 + 4

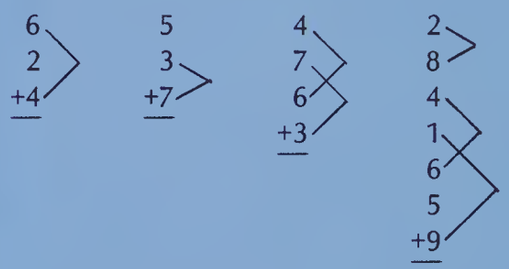
f. 9 + 5

2. Provide counters and ten frames to accompany the following exercise.

a. 9 + 5 = 10 + □
b. 8 + 6 = 10 + □
c. 7 + 5 = 10 + □
d. 8 + 4 = 10 + □
e. 9 + 3 = 10 + □
f. 8 + 5 = 10 + □

Enrichment

1. Show the students how to find tens to help them add three or more addends. Have them make up examples for a partner to try.



2. Expand the truck transportation theme by:

a. collecting pictures or models of trucks.
b. discussing the uses of trucks.
c. graphing the number and type of trucks that pass the school in a given period.
d. painting or drawing a highway mural and attaching a variety of truck drawings.

UNIT 9 LESSON 5

Objective A32

Subtract, with minuends to 14.

Vocabulary

Related addition fact, subtraction sentence

Direction words: Use addition facts to help you subtract.

Materials

Counters

Introducing the Lesson

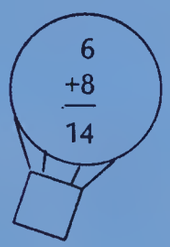
Provide 14 counters for each student and a sheet of paper with a large T on it. Have the students place the 14 counters above the T. On the chalkboard record, $\begin{array}{r|l} 14 & \\ \hline 7 & \end{array}$. Ask the students to slide 7 counters to one side and determine how many will be left for the other side. Repeat, moving the 14 counters back to the top of the T after each example. Relate the addition facts to each example.



$\begin{array}{r|l} 14 & \\ \hline 7 & 7 \end{array}$ $7 + 7 = 14$

Teaching the Lesson

Ask the students to give several addition names for 12, 13, and 14. Record these on the upper half of the chalkboard in hot air balloons. Under each balloon, record two open subtraction sentences.

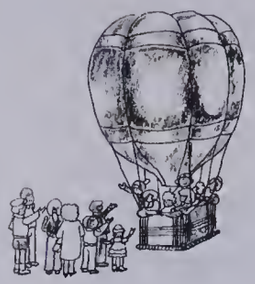


14 – 6 = ____ 14 – 8 = ____

"If we know that 6 + 8 = 14, then it can help us with 14 – 8 = ____ and 14 – 6 = ____." Have the students complete the subtraction using the addition fact. Try several other similar examples.

Name _____

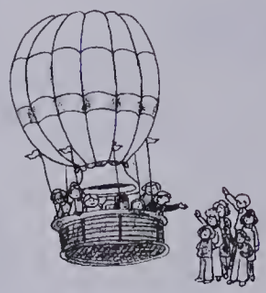
Subtract from 14.



14 – 7 = 7



14 – 9 = 5



14 – 8 = 6



14 – 5 = 9



14 – 6 = 8

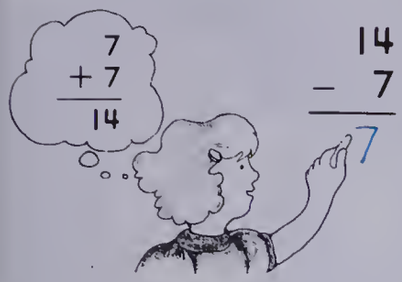
Subtract.

14 − 6 = 8	13 − 5 = 8	14 − 7 = 7	12 − 8 = 4	13 − 9 = 4	14 − 5 = 9
11 − 6 = 5	14 − 9 = 5	12 − 6 = 6	14 − 8 = 6	11 − 2 = 9	12 − 3 = 9

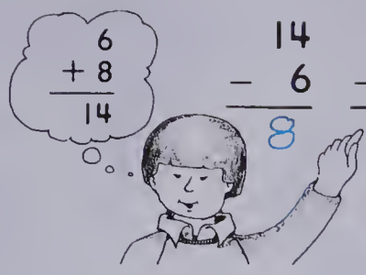
Using the Pages

- On page 177, show that there are 14 people for each balloon. Explain that some people ride away. How many are left?
- Do the examples on page 178 with the students and show how addition facts can help to subtract. Students must think of the related addition fact for each pair of subtraction examples, record it, and then use it to subtract. Less able students may require help finding the related addition sentence.

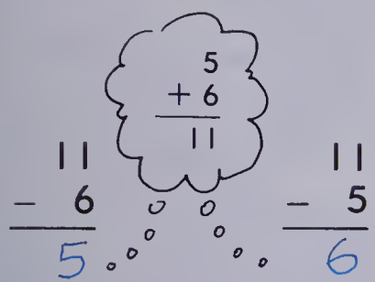
Use addition facts to help you subtract.



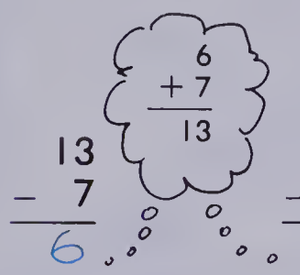
$$\begin{array}{r} 14 \\ -\ 7 \\ \hline 7 \end{array}$$



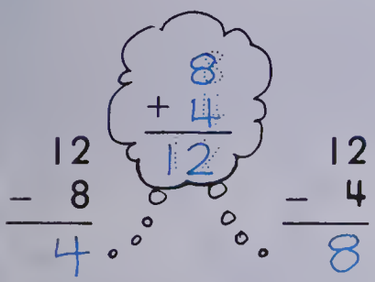
$$\begin{array}{r} 14 \\ -\ 6 \\ \hline 8 \end{array} \qquad \begin{array}{r} 14 \\ -\ 8 \\ \hline 6 \end{array}$$



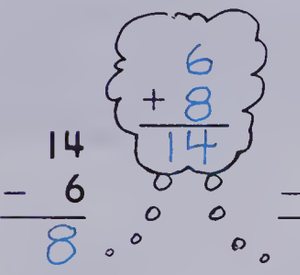
$$\begin{array}{r} 11 \\ -\ 6 \\ \hline 5 \end{array} \qquad \begin{array}{r} 11 \\ -\ 5 \\ \hline 6 \end{array}$$



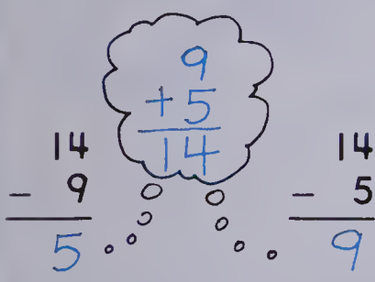
$$\begin{array}{r} 13 \\ -\ 7 \\ \hline 6 \end{array} \qquad \begin{array}{r} 13 \\ -\ 6 \\ \hline 7 \end{array}$$



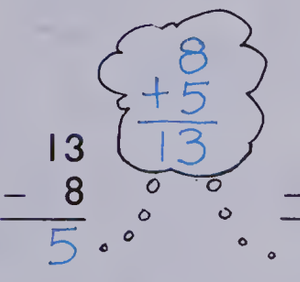
$$\begin{array}{r} 12 \\ -\ 8 \\ \hline 4 \end{array} \qquad \begin{array}{r} 12 \\ -\ 4 \\ \hline 8 \end{array}$$



$$\begin{array}{r} 14 \\ -\ 6 \\ \hline 8 \end{array} \qquad \begin{array}{r} 14 \\ -\ 8 \\ \hline 6 \end{array}$$



$$\begin{array}{r} 14 \\ -\ 9 \\ \hline 5 \end{array} \qquad \begin{array}{r} 14 \\ -\ 5 \\ \hline 9 \end{array}$$



$$\begin{array}{r} 13 \\ -\ 8 \\ \hline 5 \end{array} \qquad \begin{array}{r} 13 \\ -\ 5 \\ \hline 8 \end{array}$$

Extra Practice

Worksheet A32
Pages 177-178

Subtract.

$$\begin{array}{r} 11 \\ -\ 6 \\ \hline 5 \end{array} \quad \begin{array}{r} 12 \\ -\ 5 \\ \hline 7 \end{array} \quad \begin{array}{r} 14 \\ -\ 9 \\ \hline 5 \end{array} \quad \begin{array}{r} 12 \\ -\ 9 \\ \hline 3 \end{array} \quad \begin{array}{r} 13 \\ -\ 7 \\ \hline 6 \end{array} \quad \begin{array}{r} 11 \\ -\ 3 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 12 \\ -\ 6 \\ \hline 6 \end{array} \quad \begin{array}{r} 14 \\ -\ 8 \\ \hline 6 \end{array} \quad \begin{array}{r} 13 \\ -\ 9 \\ \hline 4 \end{array} \quad \begin{array}{r} 14 \\ -\ 7 \\ \hline 7 \end{array} \quad \begin{array}{r} 14 \\ -\ 5 \\ \hline 9 \end{array} \quad \begin{array}{r} 12 \\ -\ 7 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 12 \\ -\ 8 \\ \hline 4 \end{array} \quad \begin{array}{r} 13 \\ -\ 5 \\ \hline 8 \end{array} \quad \begin{array}{r} 14 \\ -\ 6 \\ \hline 8 \end{array} \quad \begin{array}{r} 12 \\ -\ 6 \\ \hline 6 \end{array} \quad \begin{array}{r} 11 \\ -\ 2 \\ \hline 9 \end{array} \quad \begin{array}{r} 13 \\ -\ 8 \\ \hline 5 \end{array}$$

Reinforcement

1. Provide cards of related addition and subtraction facts for matching.

14 – 9 = 5	9 + 5 = 14

2. Give the students some Ts to complete as was done in the lesson. Ask them to write the four related addition and subtraction sentences for each.

$$\begin{array}{r|l} 14 & \\ \hline 9 & \square \end{array} \qquad \begin{array}{r|l} 14 & \\ \hline 8 & \square \end{array}$$

14 – 9 = 5
14 – 5 = 9
9 + 5 = 14
5 + 9 = 14

14 – 8 = 6
14 – 6 = 8
8 + 6 = 14
6 + 8 = 14

Enrichment

Expand on the air balloon theme by researching their kinds and uses. Illustrate the findings on a bulletin board display. Have an air balloon design contest for the most decorative or attractive balloon. Suspend the designs from the ceiling.

UNIT 9 LESSON 6

Objective A33

Add, with sums to 15.

Vocabulary

Addition table, addition names

Materials

Blank addition table worksheets
Counters
Crayons

Introducing the Lesson

Provide a worksheet of a blank addition table. (This can be used to illustrate how many facts the students have acquired to date and how few are left to be mastered.) Have the students fill in the sums to 10. As a group, fill in the sums of 11, 12, 13, and 14. Have the students try to guess which combinations add to 15. Show them how to colour these squares. Record the addition names for 15 on the chalkboard: 9 + 6, 6 + 9, 7 + 8, and 8 + 7.

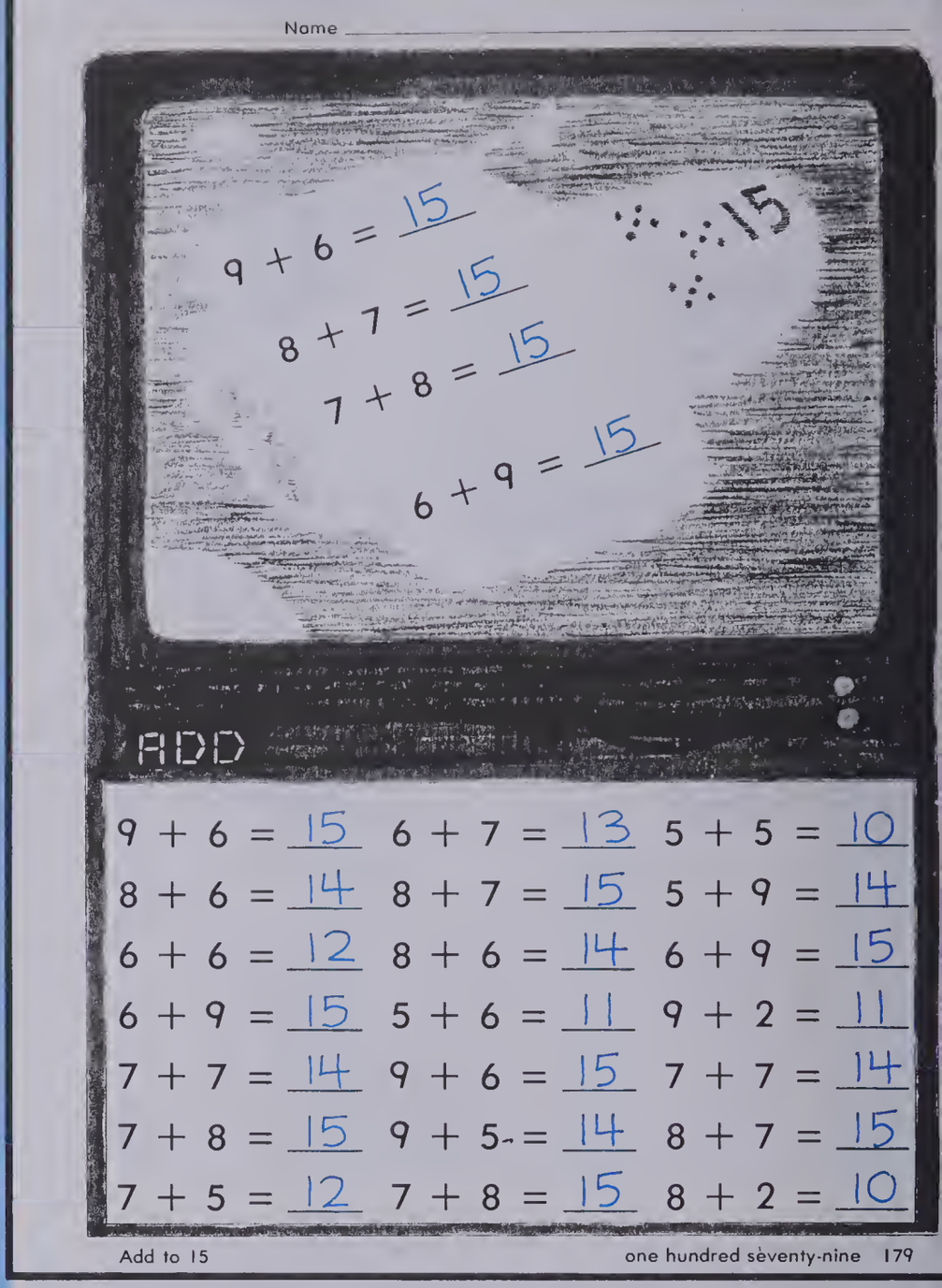
+	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										15
7									15	
8								15		
9							15			

Teaching the Lesson

Have the students place 15 counters in a row in front of them. Ask them to group the counters in 5s and then separate 10 and 5. A pencil can be the divider.

Record 10 + 5 = 15. Have the students move the divider to the left to show 9 + ____ = 15 and then name and record the fact, 9 + 6 = 15. The students can move their divider to the left again to show 8 + ____ = 15. Repeat until the students have recorded a list of 6 addition names.

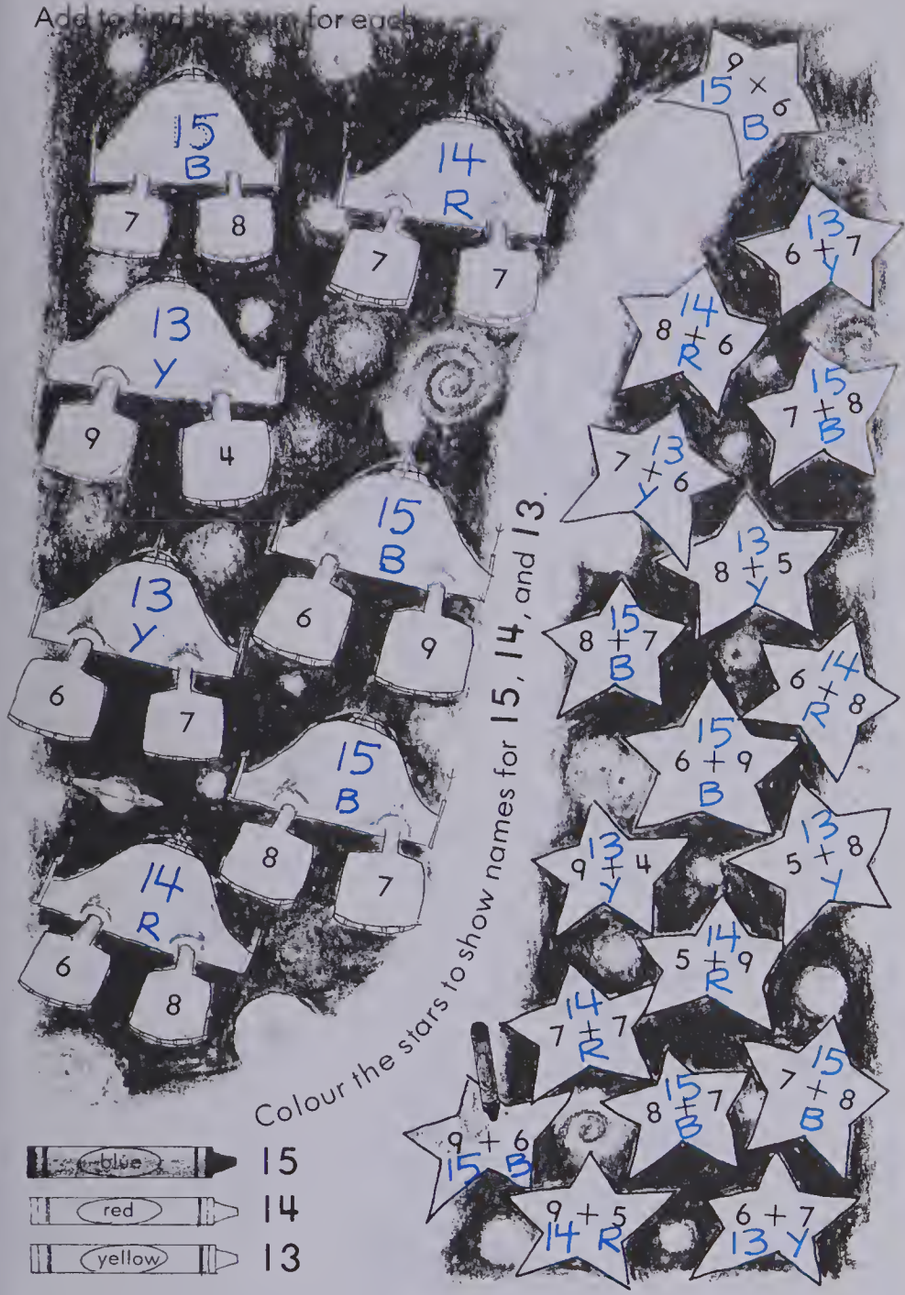
Demonstrate that knowing that 10 + 5 = 15 can help with 9 + 6 and 8 + 7. Encourage the students to verbalize as they use their divider on the counters. *Nine plus six is like ten plus five.*



Using the Pages

- Page 179 reviews various addition facts. Encourage the students to establish a work strategy for doing the exercise, such as doing all of the 9 + ____ exercises first; or using one fact to solve another, e.g., 9 + 6 = 15, so 8 + 6 will be one less.
- Draw on the chalkboard an example of the space ship activity on page 180. Show the students how to write the sum in the blank area of the space ship. Emphasize that the parts are given and that the pupils must find the sum. Crayons are required to colour the names on the right side of the page.

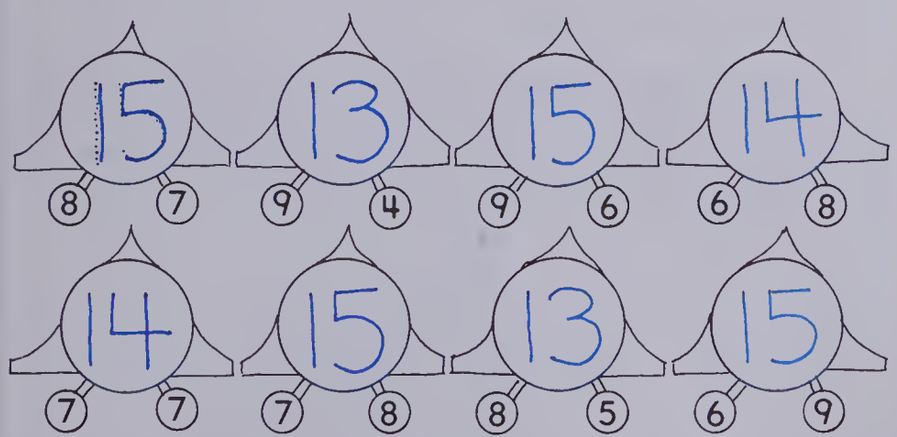
Add to find the sum for each.



Extra Practice

Worksheet A33
Pages 179-180

Add to find the sum for each.



Reinforcement

1. Show the students how to make a five-pointed star and then give them a 10 cm square of paper. Ask the students to draw, colour, and cut out a large star. Then have them record an addition name for 13, 14, or 15 on it. The stars can be used for a sorting game.

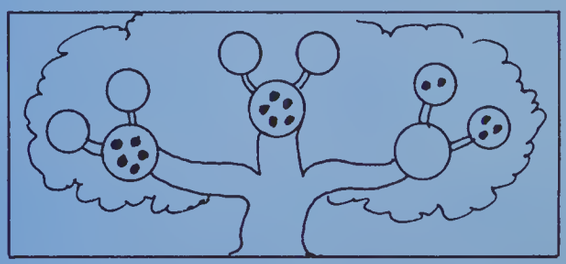


2. Make a star-path game board as shown below. Use the above-mentioned star cards and a marker for each player. To move along the star path, players draw a star card, in turn, and then must say that the fact on the card is the same as 10 + ? For example, if 8 + 7 is drawn, the player must know that it is the same as 10 + 5 and move ahead 5 spaces. Each player, then, will move ahead 3, 4, or 5 spaces.



Enrichment

1. Display a large tree chart. Have the students use counters on it to illustrate different addition names for 15 having several addends. Follow these steps.
a. Divide the 15 counters into three groups. Record 5 + 5 + 5 = 15.
b. Divide one group of 5 counters and record, e.g., 2 + 3 + 5 + 5 = 15.
c. Continue dividing and recording names until all counters have been moved to the highest parts of the tree.



2. Expand on the space travel theme by having the students talk and write about an imaginary space trip or life on a space station.

UNIT 9 LESSON 7

Objective A34

Subtract, with minuends to 15.

Vocabulary

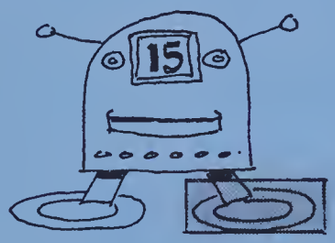
Subtraction name, number family, related sentences

Materials

Poster board
Paper plates
Counters

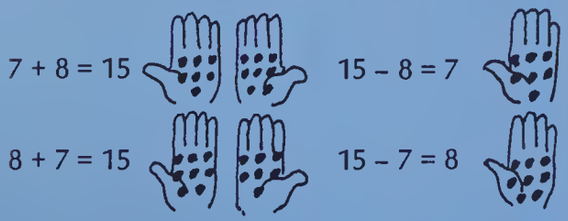
Introducing the Lesson

Draw an imaginary space creature on poster paper and cut an opening for a mouth. Tape a folded strip of poster paper behind its mouth with both ends standing on paper plates, making the creature's legs and feet. The creature is to be fed 15 treats which may be bingo chips or other counters. Ask a student to feed the creature 15 treats putting some into each side of its mouth so they slide down each leg. Cover one foot of the creature. After the students count how many treats are on the uncovered foot, have them guess how many are on the covered foot.



Teaching the Lesson

Provide the students with 15 counters. If 7 are in one hand, how many will be left in the other? Give oral directions as the students model related addition and subtraction sentences.



Ask the students for an addition name for 15. Record it and ask another student to write the related addition sentence (switching addends). Write 15 – ■ = ■ on the chalkboard. Ask the students to complete the fact family.

Name _____



15 − 7 = 8	15 − 8 = 7			
15 − 9 = 6	15 − 6 = 9			

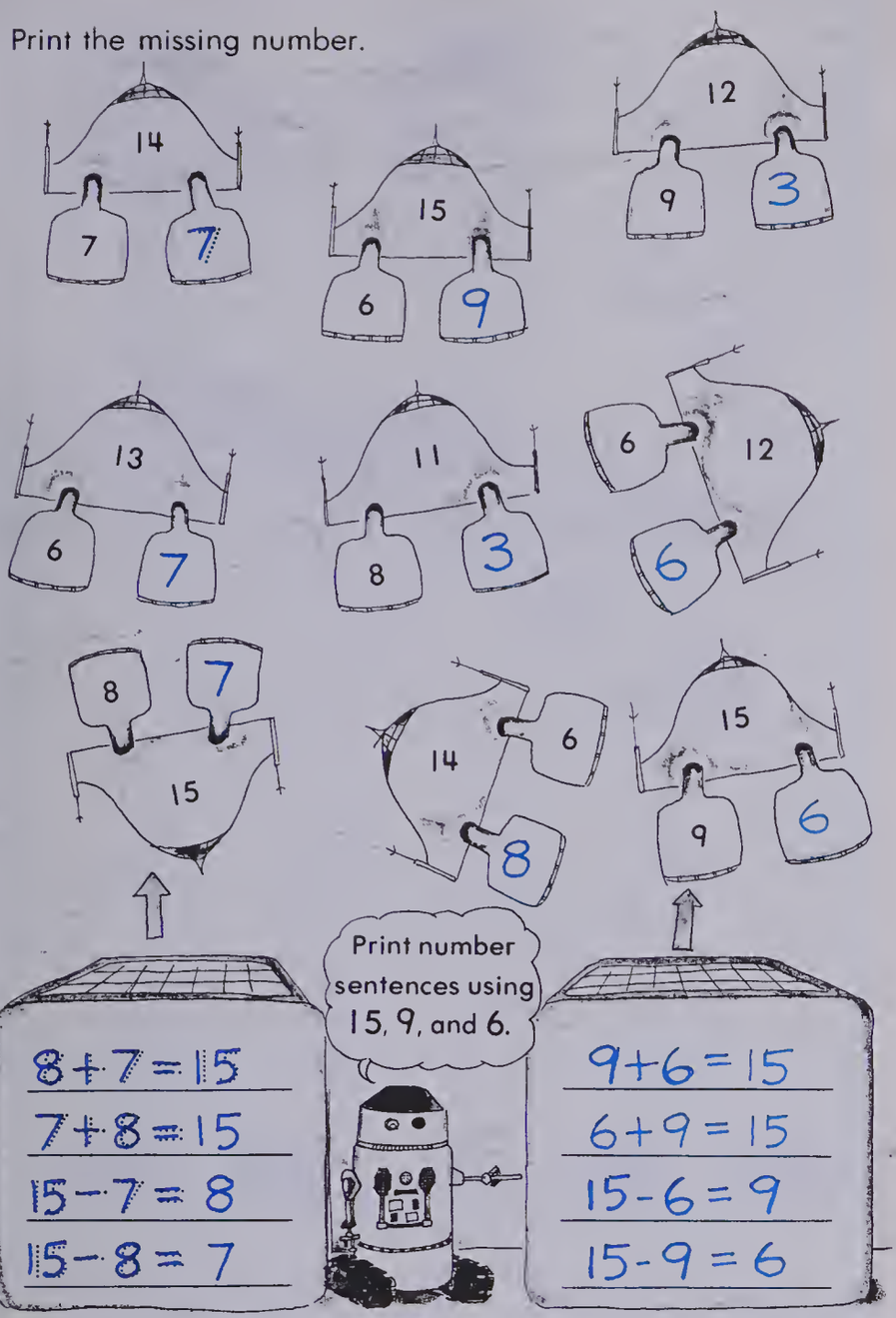
Subtract.

15 − 6 = 9	14 − 7 = 7	12 − 3 = 9	13 − 6 = 7	15 − 8 = 7
14 − 9 = 5	13 − 4 = 9	15 − 9 = 6	14 − 6 = 8	15 − 7 = 8
12 − 6 = 6	15 − 8 = 7	14 − 8 = 6	15 − 6 = 9	13 − 8 = 5
15 − 9 = 6	14 − 5 = 9	12 − 8 = 4	15 − 7 = 8	11 − 5 = 6

Using the Pages

- Have the students count the rockets on page 181 to establish that there are fifteen in all. Show how these rockets can be used to model the subtraction examples on the page by partitioning off a subset to be left with the difference. Provide counters for those students who require them.
- The activity on page 182 is similar to the activity in Introducing the Lesson. Show the students how the space vehicles can be interpeted as, e.g., 14 – 7 = ? Or, "What goes with 7 to make 14 in all?" Some students may need help writing the fact families at the bottom of the page.

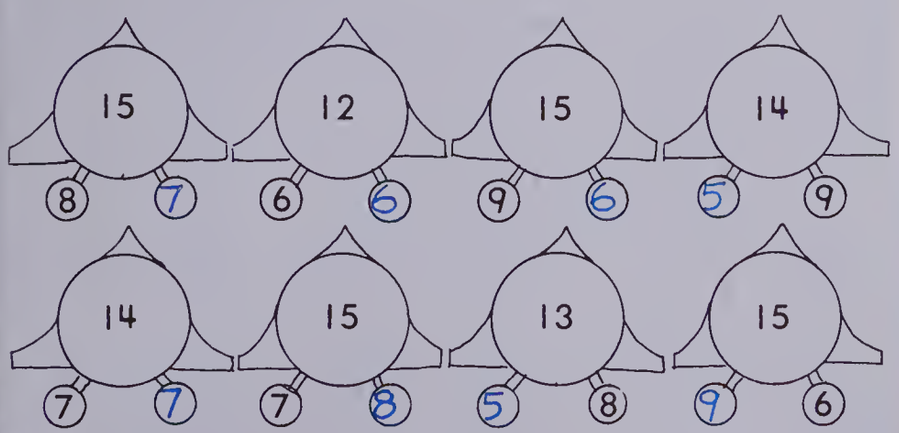
Print the missing number.



Extra Practice

Worksheet A34
Pages 181-182

Subtract to find the missing number.



Reinforcement

1. Give the students the following chalkboard or worksheet exercise in matching related sentences.

a.	6 + 8 = 14	15 – 7 = □
b.	9 + 6 = □	14 – 8 = □
c.	7 + 7 = □	15 – 6 = □
d.	8 + 7 = □	13 – 4 = □
e.	6 + 7 = □	14 – 7 = □
f.	5 + 9 = □	13 – 7 = □
g.	9 + 4 = □	14 – 9 = □

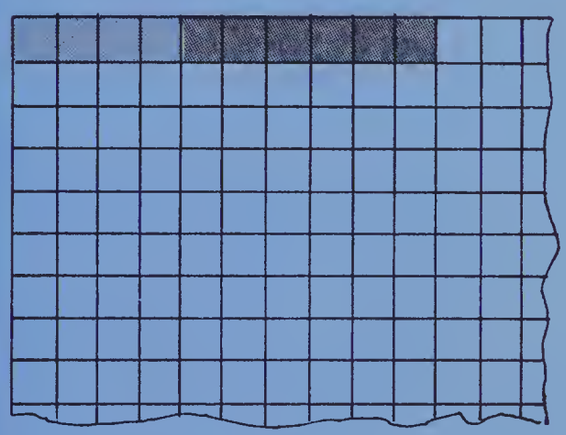
2. Provide counters and a worksheet with Ts on it. Have the students model subtraction facts with minuends of 15 as was suggested in the Introducing the Lesson activity of Lesson 5, page 177.



15 – 9 = 6
9 + 6 = 15

Enrichment

Have the students name the four number sentences or number families for each of 10, 12, and 15 using Cuisenaire rods (or coloured paper strips) and centimetre graph paper.



4 + 6 = 10
6 + 4 = 10
10 – 4 = 6
10 – 6 = 4

UNIT 9 LESSON 8

Objective A35

Add, with sums to 18.

Vocabulary

Sum, addition sentence, addition table
Direction words: Add and colour to find the path to the treasure.

Materials

Addition table worksheet
"Gold" coins
Crayons

Introducing the Lesson

This lesson introduces these six new basic fact combinations for sums of 16, 17, and 18: 8 + 8, 9 + 7, 7 + 9, 8 + 9, 9 + 8, and 9 + 9. This completes the 100 basic facts to be learned.

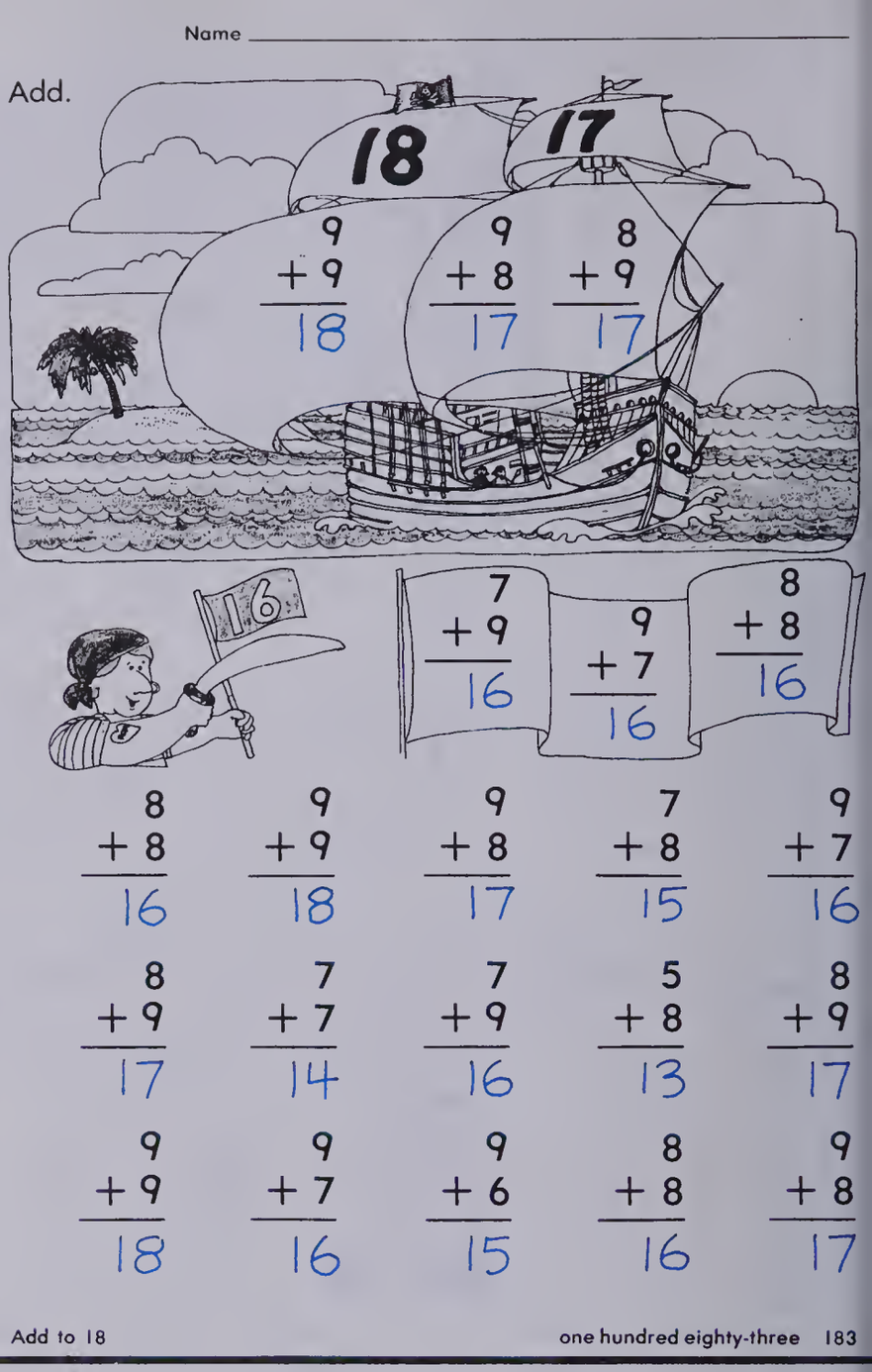
Have the students identify these new combinations by using the addition table made in Lesson 6, page 179. The addition table should then be filled in completely.

Teaching the Lesson

Have "gold" coins ready to enhance the pirate ship theme on the pupils' pages. Make two rows of eight coins. Ask a student to record an addition sentence to describe the coins, 8 + 8 = 16. Move one coin to the other subset. Record the addition sentence, 7 + 9 = 16. Ask a student to name the addition sentence corresponding to 7 + 9 = 16; namely, 9 + 7 = 16.

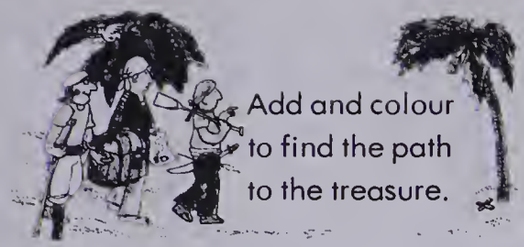
Add a new coin to the set to elicit the facts 9 + 8 = 17 and 8 + 9 = 17. Add a final coin to elicit the 9 + 9 = 18 combination.

Provide the students with paper and crayons. Ask them to draw two groups of seven coins and then record 7 + 7 = 14. Have them add one more coin to get 7 + 8 = 15. Repeat for 8 + 8 and 8 + 9. Point out how doubles are used to find sums for doubles plus one.



Using the Pages

- On page 183, draw the students' attention to the six new facts (introduced in the lesson) at the top of the page.
- The students should find all the sums on page 184 before colouring. Once coloured, a one-colour path will lead to the treasure chest. Have the students mark one anothers' papers using colour as a guide.



Add and colour to find the path to the treasure.

18 orange
17 blue
16 green
15 yellow
14 red

7 + 7 = 14 R	7 + 9 = 16	9 + 9 = 18		
9 + 5 = 14 R	6 + 8 = 14 R	5 + 9 = 14 R	8 + 6 = 14 R	9 + 8 = 17
9 + 7 = 16	9 + 9 = 18	8 + 9 = 17	7 + 7 = 14 R	7 + 8 = 15
8 + 9 = 17	8 + 6 = 14 R	9 + 5 = 14 R	6 + 8 = 14 R	8 + 8 = 16
8 + 8 = 16	5 + 9 = 14 R	9 + 8 = 17	9 + 6 = 15	9 + 9 = 18



Which chest holds the treasure? Mark it with an X.

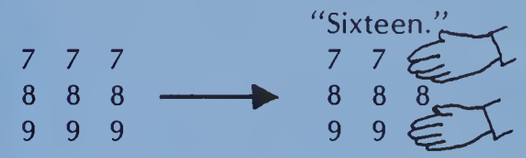
Extra Practice **Worksheet A35**
Pages 183-184

Look for patterns.
Find one more or one less.

8 + 8 = 16	7 + 7 = 14	9 + 9 = 18
9 + 8 = 17	8 + 7 = 15	9 + 8 = 17
4 + 4 = 8	8 + 8 = 16	5 + 5 = 10
4 + 5 = 9	8 + 9 = 17	5 + 4 = 9
8 + 8 = 16	6 + 6 = 12	7 + 7 = 14
8 + 7 = 15	6 + 7 = 13	7 + 6 = 13

Reinforcement

1. Have the students write the following number arrangement on paper. Call a number from 14 to 18. See how quickly the students can cover two numbers that add to the called number.



2. Prepare and provide eight Numeral Cards (18, 17, 17, 16, 16, 16, 15, 15) and eight Addition Name Cards (9 + 9, 8 + 9, 9 + 8, 9 + 7, 7 + 9, 8 + 8, 7 + 8, 8 + 7). Use these 16 cards for playing Concentration. The students must choose two face-down cards and try to match sums. Add more card pairs (for sums of 12, 13, and 14) to make the game more difficult.

Enrichment

Provide a game sheet as shown below. Have the students take turns rolling two dice marked 9, 8, 7, 6, 5, and ★. The objective of the game is to be the first to fill in all of the sums on your sheet. If a player rolls, e.g., 5 and 9 with the dice, both the 5 + 9 and 9 + 5 squares on the game sheet may be filled in with the sum, 14. If a double is rolled, the player gets another turn. The ★ on the die is a "wild card". The player can choose to have it represent any number when it is rolled.

+	9	8	7	6	5
9					14
8					
7					
6					
5	14				

UNIT 9 LESSON 9

Objective A36

Subtract, with minuends to 18.

Vocabulary

Number family, related sentences, whole, part, subtract ten

Materials

Blank cards
Wooden blocks

Introducing the Lesson

Ask the students to suggest numbers that make up a number family pattern and say the four related sentences as you make up the following kinds of cards.

7 9	16
Front	Back

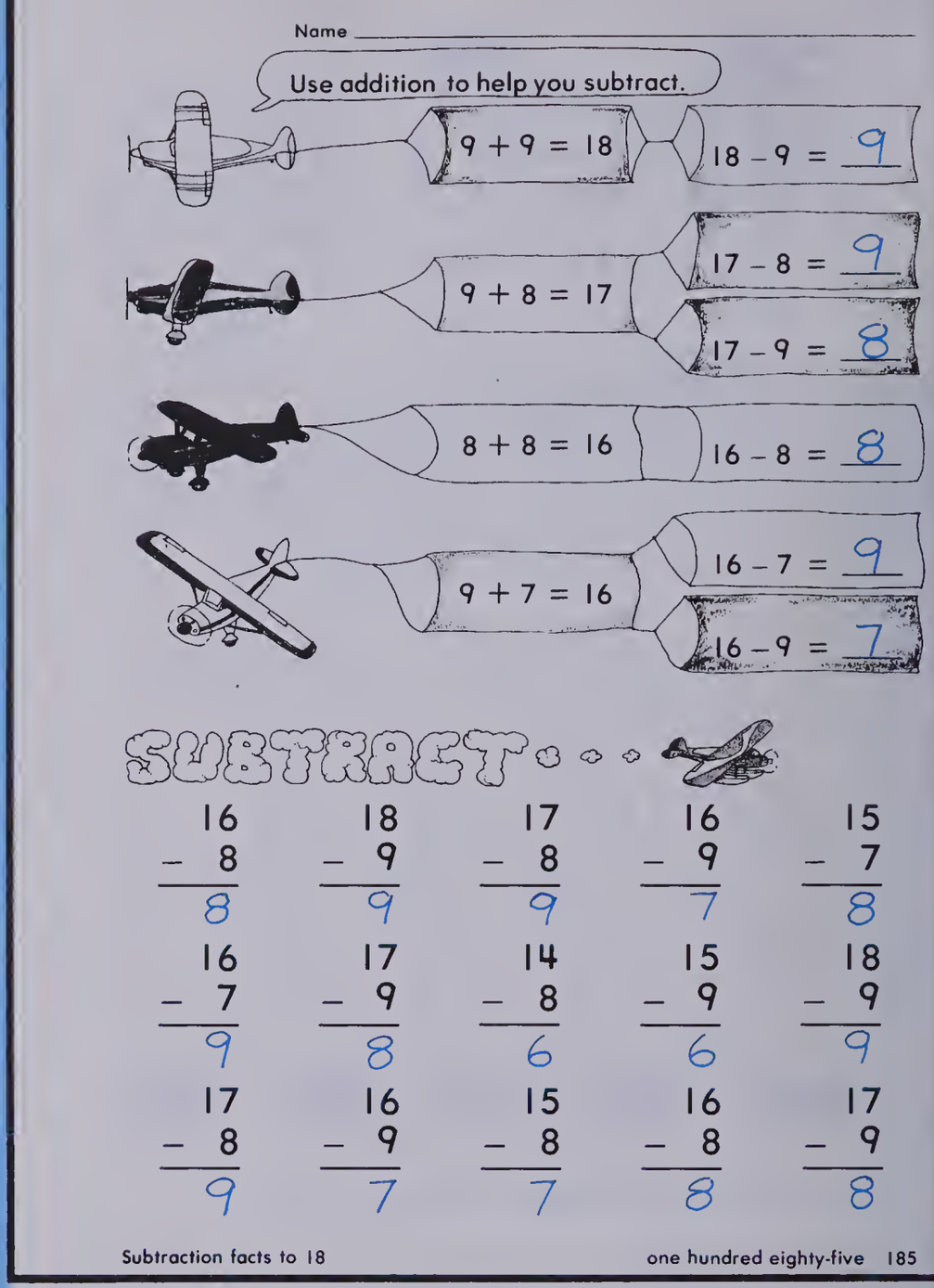
Students take turns choosing a card and challenging the others to guess the hidden number on the back. Point out that the two numbers on the front are parts of the whole, the number on the back. To use the cards for subtraction, show the sum on the back of the cards first and then one of the parts.



Teaching the Lesson

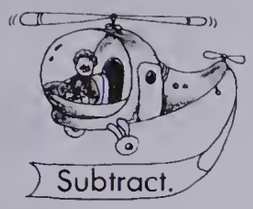
Show the students how to subtract 9 or 8 using a subtract-ten pattern first. Line up 16 blocks. Put a ruler between them to separate 10 of them. Say as you move the 10 blocks away, "16 – 10 = 6, so 16 – 9 = 7." Repeat with various starting sets. Also use the subtract-ten pattern first in subtract 8 examples.

Prepare flash cards similar to those at the bottom of page 186. Have the students subtract to determine the number named by the card. Emphasize that there are many subtraction names for each number.



Using the Pages

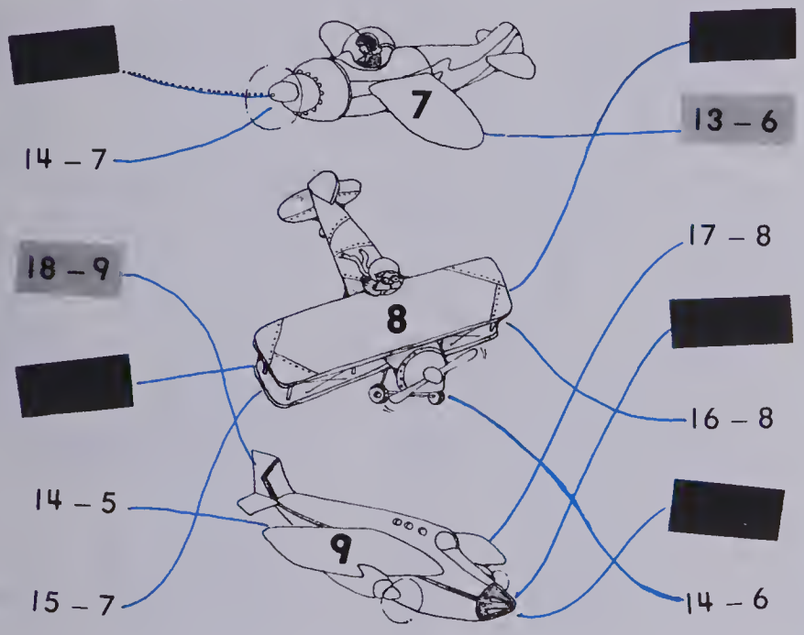
- Complete the examples at the top of page 185 together. Emphasize how knowing addition facts can help you subtract. As the students do the exercise at the bottom of the page, encourage them to say, e.g., *"What goes with 8 to make 16?"*
- At the top of page 186, encourage the students to think, e.g., "What goes with 9 to make 16 in all?" Point out that 16 – 9 is a subtraction name for 7. At the bottom of the page, point out that there are several subtraction names to be matched with each plane. Some students may need help with this exercise.



Subtract.

16 – 9 = 7	17 – 8 = 9	
15 – 8 = 7	13 – 5 = 8	
16 – 8 = 8	17 – 9 = 8	16 – 7 = 9
18 – 9 = 9	14 – 7 = 7	15 – 7 = 8
17 – 8 = 9	16 – 7 = 9	16 – 8 = 8
15 – 6 = 9	18 – 9 = 9	15 – 9 = 6

Match names.



Extra Practice

Worksheet A36
Pages 185-186

Subtract.

16 – 10 = 6	16 – 9 = 7	16 – 8 = 8	16 – 7 = 9
17 – 10 = 7	17 – 9 = 8	17 – 8 = 9	17 – 7 = 10
18 – 10 = 8	18 – 9 = 9	18 – 8 = 10	18 – 7 = 11

Reinforcement

1. Give each student cards labelled 6, 7, 8, and 9. Call out numbers from 15 to 18. Have the students hold up two cards that add to that number. If they want to double the number, they hold the card on their heads.

Sixteen



2. Give the students the number-family pattern cards from Introducing the Lesson. Ask them to write the four related number sentences for each.

Enrichment

Ask the students to find as many addition names for 18 as they can that use one number repeatedly, e.g., 9 + 9, or 6 + 6 + 6.

UNIT 9 LESSON 10

Objective A37

Add doubles with speed and accuracy; add doubles plus one.

Vocabulary

Doubles, doubles plus one

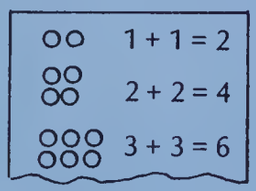
Materials

Chart paper
Doubles Addition Name Cards
Coloured stickers

Introducing the Lesson

Doubles, e.g., 3 + 3, are considered easier to remember than many other basic facts. This lesson is designed to show the students (particularly those who count out all combinations) that they are capable of memorizing facts.

Prepare a chart which illustrates the patterns involved in doubles combinations. Read the number sentences with the students. Cover the sums and have the students try to say the number sentences. Finally, cover the number sentences completely and have the students give the sentences for the illustrated sets.

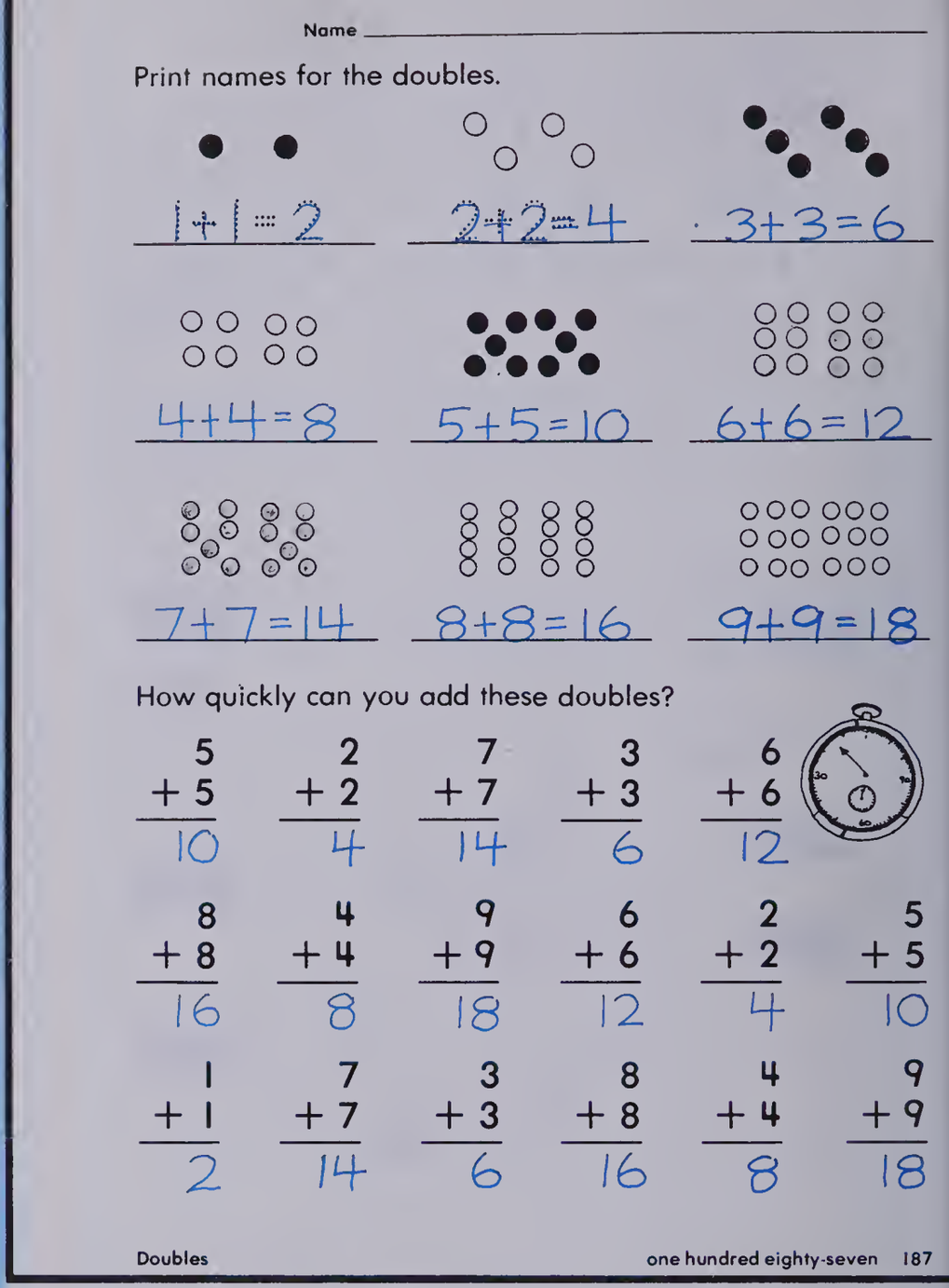


Teaching the Lesson

Flash doubles Addition Name Cards for practice in instant recall of sums. Encourage the students to guess if they continue to count.

Have the students close their eyes. Call out doubles combinations as the students quickly answer with the sum.

Show the doubles chart used earlier, but with fresh paper over the number sentences. Add one different-coloured sticker to each set and record the new number sentence. Explain, e.g., how 4 + 5 is one more than 4 + 4. Now cover the illustrated sets. Have the students name the doubles hidden in each combination. They may check by looking at the illustration if necessary.


Name _____

Print names for the doubles.

1+1=2 | 2+2=4 | 3+3=6

4+4=8 | 5+5=10 | 6+6=12

7+7=14 | 8+8=16 | 9+9=18

How quickly can you add these doubles?

5 + 5 = 10	2 + 2 = 4	7 + 7 = 14	3 + 3 = 6	6 + 6 = 12	
8 + 8 = 16	4 + 4 = 8	9 + 9 = 18	6 + 6 = 12	2 + 2 = 4	5 + 5 = 10
1 + 1 = 2	7 + 7 = 14	3 + 3 = 6	8 + 8 = 16	4 + 4 = 8	9 + 9 = 18

Doubles one hundred eighty-seven 187

Using the Pages

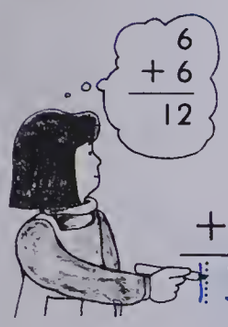
- After the students have recorded the doubles combinations on page 187 to match the illustrated sets, time them on the exercise at the bottom of the page. Check the answers as a group before assigning the next page.
- For students who constantly count out sums, page 188 should be used as a guided lesson. Use concrete materials to emphasize the pattern of finding a double.

Add.

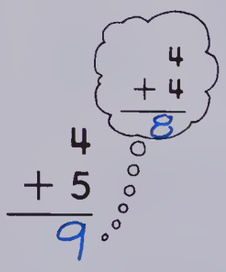
DOUBLES PLUS ONE

$2+2=4$	$2+3=5$	$6+6=12$	$6+7=13$
$8+8=16$	$9+8=17$	$4+4=8$	$5+4=9$
$3+3=6$	$3+4=7$	$7+7=14$	$7+8=15$
$1+1=2$	$2+1=3$	$5+5=10$	$6+5=11$

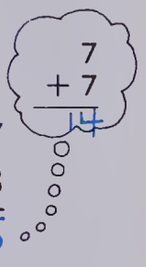
Think of a double to help you add.



$6+7=13$



$4+5=9$



$7+8=15$

$2+3=5$	$6+5=11$	$9+8=17$	$4+3=7$	$7+6=13$

Extra Practice **Worksheet A37**

Pages 187-188

How quickly can you add these doubles?
Time yourself.

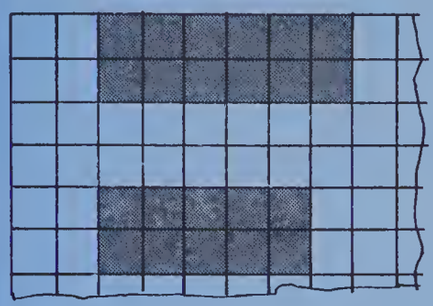
$3+3=6$, $3+4=7$	$7+7=14$, $7+8=15$	$5+5=10$, $5+6=11$	$8+8=16$, $8+9=17$
$6+6=12$, $6+7=13$	$4+4=8$, $4+5=9$	$2+2=4$, $2+3=5$	$9+9=18$, $9+10=19$

$6+6=12$ $6+7=13$	$7+7=14$ $7+8=15$	$8+8=16$ $8+9=17$

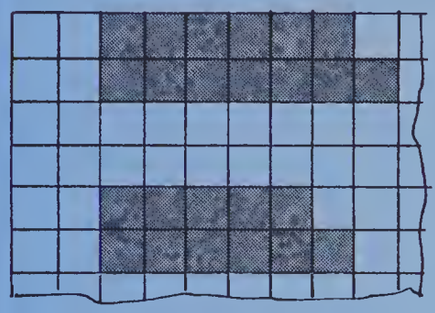
I took ☐ seconds.

Reinforcement

1. Provide graph paper for the students to colour doubles combinations and record a number sentence to match.



2. The students can colour squares on graph paper to illustrate doubles-plus-one combinations.



Enrichment

1. Play a *Double It* game using a die marked with the numerals from 4 to 9. Each student, in turn, rolls the die; doubles the number rolled; and says the sum.

2. Play *Doubles Plus One* by rolling the die described above; doubling the number rolled; and adding one.

UNIT 9 LESSON 11

Objective PS9

Add and subtract mixed questions; solve simple word problems to sums of 18.

Vocabulary

Add, subtract, story problems

Materials

Cardboard
Circular cards
Addition and Subtraction Name Cards
Toy cars

Introducing the Lesson

Prepare a cardboard number wheel with the numerals from 2 to 9. Prepare circular cards that fit in the centre of the wheel that are labelled with the numerals from 2 to 9. Tape the wheel to the chalkboard. As one student places different circular cards in the centre of the wheel, ask another student to add the centre number to all outer numbers. Answers are recorded outside the wheel on the chalkboard.

Teaching the Lesson

Remove the wheel from the chalkboard, leaving the sums. Draw in the centre spaces and the number that was in the centre. Have the students subtract to name the missing addends.

Flash mixed Addition and Subtraction Name Cards. Have the students, in turn, read a card and then give the sum or difference. Complete number sentences also can be written on paper.

Display toy cars. Ask the students to model these examples.
a. There are 6 red cars and 4 green cars. How many cars are there in all?
b. There are 14 cars. Six cars drive away. How many cars are left?

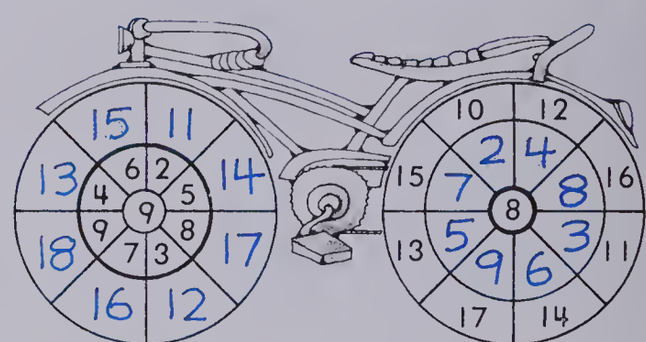
After a few oral examples, print the situations on the chalkboard for the students to solve.
16 cars.
8 cars drive away. 16
How many are left? −8



Name _____

Add or subtract.

5 + 5 = 10	5 + 6 = 11	11 − 3 = 8	7 + 7 = 14	15 − 8 = 7	
13 − 6 = 7	6 + 6 = 12	17 − 9 = 8	9 + 3 = 12	12 − 4 = 8	
9 + 4 = 13	8 + 7 = 15	14 − 5 = 9	6 + 5 = 11	12 − 6 = 6	6 + 7 = 13
9 + 9 = 18	18 − 9 = 9	4 + 8 = 12	8 + 5 = 13	15 − 6 = 9	8 + 8 = 16
9 + 7 = 16	14 − 6 = 8	9 + 8 = 17	13 − 4 = 9	16 − 7 = 9	6 + 8 = 14



Add or subtract to 18

one hundred eighty-nine 189

Using the Pages

- Page 189 involves mixed addition and subtraction practice. The bicycle activity at the bottom of the page is for enrichment and may not be appropriate for some students.
- Read over each problem situation on page 190. Discuss the object illustrated in each situation. Make certain that the students correctly interpret the subtraction action in some illustrations.



8 + 6 = 14

How many in all? 14

14 in all

9 + 7 = 16

How many in all? 16

16 in all

12 − 6 = 6

How many are left? 6

6 are left.

17 − 9 = 8

How many are left? 8

8 are left.

5 + 8 = 13

How many in all? 13

13 in all

16 − 8 = 8

How many are left? 8

8 are left.

14 − 5 = 9

How many are left? 9

9 are left.

7 + 8 = 15

How many in all? 15

15 in all

Extra Practice **Worksheet PS9**

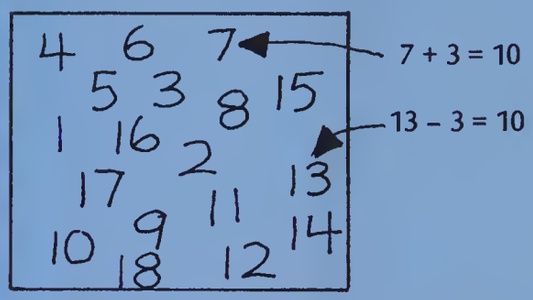
Pages 189-190

Add or subtract.

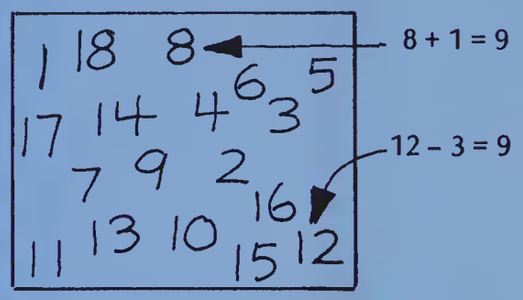
6 + 5 = 11	12 − 3 = 9	15 − 7 = 8	8 + 8 = 16	4 + 8 = 12	1 + 9 = 10
15 − 6 = 9	7 + 9 = 16	18 − 9 = 9	12 − 6 = 6	7 + 7 = 14	6 + 9 = 15
9 + 9 = 18	16 − 8 = 8	17 − 9 = 8	14 − 5 = 9	3 + 9 = 12	13 − 8 = 5

Reinforcement

1. Provide a sheet of paper for each student. Ask the students to write the numerals from 1 to 18 on this paper and then decide what number to add or subtract from each number written to get 10.



2. Repeat the above activity but this time the students must decide what number to add or subtract from each number written to get 9.



Enrichment

Ask pairs of students to make up story problems as on page 190 using other types of vehicles. Students exchange the problems and solve.

Problem Solving Activities

Assign Level 2, Unit 9

UNIT 9 LESSON 12

Objective PS10

Solve comparison, subtraction word problems.

Vocabulary

Compare, more, less

Materials

Interlocking cubes
Large graph paper

Introducing the Lesson

Give each student a handful of interlocking cubes. Have them join the cubes in a row. Ask two students to compare their cubes. "Who has more? How many more?" The students count to solve. Show how subtracting 9 will give the difference.

Becky
Ron — 4 more

$$\begin{array}{r} 13 \\ -\ 9 \\ \hline 4 \end{array}$$

Repeat, using several similar examples.

Teaching the Lesson

Record a list of students' names on chart-sized graph paper. Ask the students to count and compare the number of letters in the first and last names of two students.

R	o	b	e	r	t	a	G	r	a	n	t	12 letters
D	a	n	n	y	G	o	t	o	3 more			9 letters

"Who has more letters?" *Roberta*
"How many more?" 12 – 9 = 3

Use the names on graph paper to practise oral addition as well. Have the students record horizontal number sentences.

(You may want to limit examples to names with less than ten letters. This will provide practice with addition facts and avoid regrouping examples.)

Give the students an opportunity to try to record a number sentence to match a work problem. Use both addition and comparison subtraction examples. Use either the name chart or the postcard chart on page 191 as the subject of the work problems.

Name _____



POSTCARD COLLECTIONS					
Glen	Kelly	Pam	Ron	Ken	Lynn
9	7	5	12	8	14

Glen has 9 cards.
Ron has 12 cards.
Who has more? Ron
How many more? 3
12-9=3

Pam has 5 cards.
Ken has 8 cards.
How many cards do they have in all? 13
5+8=13

Ken has 8 cards.
Kelly has 7 cards.
Who has more? Ken
How many more? 1
8-7=1

Kelly has 7 cards.
Ken has 8 cards.
How many cards do they have in all? 15
7+8=15

Glen has 9 cards.
Kelly has 7 cards.
How many cards do they have in all? 16
9+7=16

Lynn has 14 cards.
Glen has 9 cards.
Who has more? Lynn
How many more? 5
14-9=5

Using the Page

- Discuss the table at the top of page 191. Do the examples orally as a group. (Some students may need postcards to model the information in each example.)

Reinforcement

Prepare cards labelled with the numerals from 1 to 18. Have the students take turns choosing two cards from a pile of face-down cards and comparing the two numbers by subtracting. This activity can be used to generate a chalkboard exercise for the students to complete when the subtraction formed by the comparison of the two cards is recorded on the chalkboard.



Name _____

Add.

7 + 8 = 15	9 + 9 = 18	8 + 6 = 14	9 + 7 = 16	5 + 8 = 13	7 + 7 = 14

Subtract.

14 − 5 = 9	17 − 8 = 9	13 − 7 = 6	16 − 9 = 7	15 − 7 = 8	14 − 8 = 6

Add or subtract.

9 + 6 = 15	6 + 7 = 13	16 − 8 = 8	9 + 6 = 15	13 − 5 = 8	15 − 6 = 9

8 

7 

How many in all?

8+7=15

15 in all

Bob has 9 .

Jim has 13 .

Who has more? Jim

How many more? 4

13−9=4

15 

6 

How many are left?

15−6=9

9 are left.

Print number sentences using 17, 9, and 8.

9+8=17

8+9=17

17−8=9

17−9=8

Extra Practice **Worksheet PS10** Page 191

John 9 years	Anita 13 years	Who is older? Anita How much older? 4 years	13 − 9 = 4
Paul 8 years	Grant 14 years	Who is older? Grant How much older? 6 years	14 − 8 = 6
Glen 11 years	Samantha 7 years	Who is older? Glen How much older? 4 years	11 − 7 = 4
Nancy 6 years	Bob 15 years	Who is older? Bob How much older? 9 years	15 − 6 = 9

UNIT 9 TEST

Part 1: Add to sums of 18.

Part 2: Subtract from numbers to 18.

Part 3: Add or subtract to 18.

Part 4: Solve addition and subtraction problems; write related number sentences.

Informal Assessment

Observe the students as they complete an exercise, such as that at the top of page 192. Do the students:

1. Recall most sums and differences? (If so, look for enrichment and extension activities to supplement the math program. Proceed to Unit 10.)
2. Think out most sums and differences?
 a. Do they use the doubles-plus-one method?
 b. Do they use addition facts to find the differences?
 (If so, proceed to Unit 10, but continue to provide basic fact practice in entertaining contexts to develop speed. Encourage these students to use their thinking methods when working through Unit 10 to discourage them from reverting to counting.)
3. Count on or back by ones to find sums and differences?
 (If so, work on grouping to find ten, doubles, and doubles-plus-one strategies as outlined in the introduction to Unit 9 before proceeding with Unit 10. Students who think in ones rather than in groups may not be ready for two-digit regrouping.)
4. Rely on very immature counting methods to find sums or differences?
 (If so, instead of proceeding to Unit 10, provide many more counting and grouping experiences at the concrete/concept level. Use the Reinforcement ideas from Unit 9 lessons that involve the manipulation of materials along with the recording number sentences. Work to develop counting-on skills. See the Introduction to this unit.)

UNIT 10
Addition and Subtraction with Regrouping

Theme: Food

Lesson		Objective	Pages
1	A38	Add and subtract two-digit numbers, without regrouping.	193-194
2	A39	Rename tens and ones by finding another ten.	195-196
3	A40	Add a one- and a two-digit number, with regrouping.	197-198
4	A41	Add 2 two-digit numbers, with regrouping.	199-200
5	A42	Add 2 two-digit numbers, with and without regrouping.	201-202
6	A43	Subtract from numbers to 18; regroup for subtraction.	203-204
7	A44	Subtract a one-digit number from a two-digit number, with regrouping.	205-206
8	A45	Subtract 2 two-digit numbers, with regrouping.	207-208
9	A46	Subtract 2 two-digit numbers, with and without regrouping.	209-210
10	A47	Add or subtract 2 two-digit numbers, with and without regrouping.	211
Test		Addition and subtraction with regrouping	212

Vocabulary

tens
sum
estimate
regroup
starting set
ones
difference
rename
trade

Printed Directions:

Find a group of 10.
Trade to get more tens.
Trade a ten to get more ones.

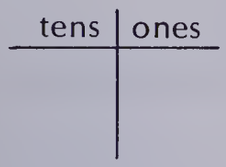
Materials

Numeral Cards for Teacher (T) and for Pupils (P)



Number line to 100

Place value mats*



Place value number blocks



Subtraction fact cards

egg cartons	counters
scissors	crayons
paper plates	plastic bags and ties
dice	interlocking cubes
graph paper	chart paper
dimes	pennies

*Available in the Houghton Mifflin K-2 Activity Kit.

About This Unit

Unit 10 deals with the addition and subtraction of two-digit numbers with regrouping. Not all children will be ready for this unit—regrouping in addition and subtraction is not an objective of every Grade 2 program or curriculum.

As prerequisites to Unit 10, students should be familiar with the following topics covered in previous units:

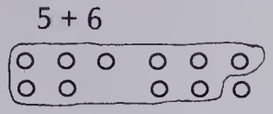
a. place value of ones, tens, and hundreds (Units 1, 3, and 6).

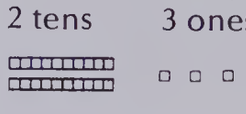
b. addition and subtraction without regrouping (Unit 7).

c. addition and subtraction facts to 18 (Units 2, 4, and 9).

Students should be able to recall sums and differences, or to use reasoning methods as outlined on page 129B of the *Teacher's Resource Book*. For students who count by ones to find sums and differences or rely heavily on counters, readiness for this unit should be carefully considered.

d. renaming ones as tens and ones, and vice versa (included in Units 1, 3, 4, 6, and 9).





___ ten ___ one

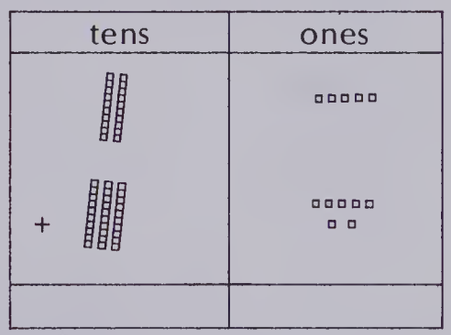
1 ten ___ ones

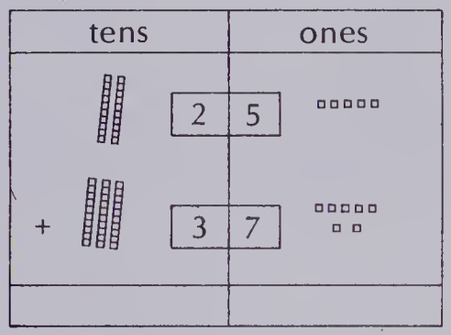
Throughout the units, materials and illustrations that emphasize place value concepts are suggested.

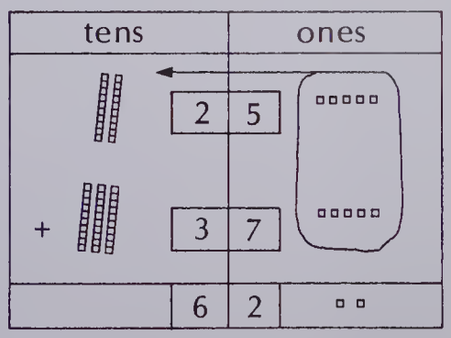


These materials are interchangeable, although often the materials illustrated on the pupil pages are the best ones to use with that particular lesson to encourage the transfer from materials to illustrations (concrete → semi-concrete).

Place value charts are used as overlays throughout the development of the addition and subtraction algorithms. If possible, provide students with individual place value mats and numeral cards for working with concrete materials.







In order to use materials effectively, teacher-directed small-group work is preferable. Try to organize the class so that most students are working on a reinforcement activity, such as review of two-digit addition with no regrouping, while you introduce the new concepts with a small group. After students have worked with materials to develop a concept, introduce the pupil page as a follow-up. Allow pupils to use materials as long as they require them. Remember that moving too quickly to an abstract rule for regrouping for addition or subtraction can cause problems later on. Pupils should be given a solid base of understanding at this beginning stage with the algorithm.

The unit theme of food is used to illustrate familiar situations where grouping or packaging by tens is possible, such as baskets or bags of apples, corn, etc. In using the theme or materials for each lesson, it is important to keep these two ideas in mind.

1. We have a question to answer, such as, "How many apples are there in all?"

48 apples
+ 5 apples
53 apples in all

2. We have the method (algorithm) for computing the answer.

tens	ones
1	
4	8
+	5
5	3

Add the ones first. Is there a group of ten to trade? Students should be encouraged to think of an application for the examples they are working on and encouraged to estimate a realistic answer before applying the algorithm. Using a number line to check answers can also help to relate the question to the method.

Ideas

All game ideas for Unit 7 involving tens and ones can be used with Unit 10. The restrictions on number size to avoid regrouping will no longer be necessary.

1. Unit 7 Activities

a. Add and Subtract Cards
b. Target Games
c. Hundred Square Hop
d. Bowling
e. Go Fish
f. Balloon Popping
g. Domino Addition
h. Flick It
i. Measure Maze

2. More Tens and Ones Activities

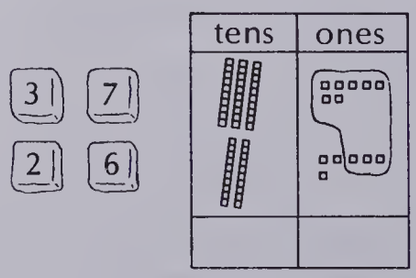
a. Roll and Build

Use a "tens" die marked 1 to 4 and a different coloured "ones" die marked 4 to 9. Two players take turns rolling both dice and recording 2 two-digit numbers on a place value chart. Players then add their examples. The player with the higher sum gets a point. The first player with 5 points wins.



tens	ones
3	7
+ 2	6

To begin, this game should be played with a place value mat, rods, and cubes so that students can find sums by adding blocks, regrouping when necessary, and then comparing.



Trade 10 cubes for 1 rod.

b. Dimes and Pennies

Prepare 29 cards with values up to 29¢, such as [25¢] and [18¢]. Take turns drawing a card and collecting that amount from a bank of dimes and pennies. If a player has ten or more pennies, they should be traded for a dime.

Later, try recording each player's turn.

I have	58¢
I draw	+27¢
Now I have	85¢

c. Coin Stamps

If coin stamps are available, have students stamp the value onto newsprint and then loop sets of ten. The first student to collect 100¢ is the winner.

d. Bank Exchange

This game is for two players. Counters of three different colours (for hundreds, tens, and ones) are needed. Each player receives counters representing 9 ones, 9 tens, and 3 hundreds. These counters are placed on the player's side of the game board. Two dice of different colours are used; the first represents ones and the other represents tens. The players, in turn, roll the dice and give their opponent counters according to the number rolled. In some cases, a player may need to go to a bank to trade 10 ones for 1 ten.

Players may never have more then 9 counters in one money bag. They must exchange with the bank when they have too many counters in a bag. The winner is the first player to have too few counters to move on a turn, or the player with the fewer counters after a given time limit.

e. Trading Post

This game is for two players. For this game, 10 blue, 20 white, and 20 red markers, along with two dice, are needed. Each player begins with 5 blue markers in a box. In turn, players roll the dice, add the numbers on the dice, and take that many white markers from the trading post. When a player has 10 or more white markers, they must be traded in for a red marker. When 10 red markers are accumulated, one blue marker may be removed. The winner is the first player to remove all of the blue markers.

f. Reach for 100

This game is for two players. Prepare four sets of numeral cards numbered from 1 to 9. Shuffle these cards and put them face down in a stack. In turn, a player takes a card from the stack and places it on his or her tens and ones mat. Cards cannot be changed once they have been placed down. After 6 turns for each player, the sum of the numbers on the mat is found. A player having a 1, 3, and 4 in the tens place and a 5, 2, and 8 in the ones place would have a sum of 95. The winner is the player who comes closest to 100 without going over.

Tens	Ones

Pretest **Unit 10**

Make a trade to get more tens.

3 tens **15** ones



4 tens 5 ones

tens	ones
~~2~~	~~12~~
3	2

tens	ones
~~5~~	~~16~~
6	6

Add.

65 + 7 = 72	8 + 29 = 37	36 + 58 = 94	27 + 43 = 70	24 + 55 = 79

Make a trade to get more ones.

5 tens **2** ones



4 tens 12 ones

tens	ones
1	13
~~2~~	~~3~~

tens	ones
2	14
~~3~~	~~4~~

Subtract.

21 − 9 = 12	43 − 8 = 35	26 − 14 = 12	82 − 47 = 35	50 − 39 = 11

Add or subtract.

26 + 58 = 84	39 − 17 = 22	62 − 38 = 24	57 + 18 = 75	80 − 44 = 36

Post-test **Unit 10**

Make a trade to get more tens.

4 tens **11** ones



5 tens 1 ones

tens	ones
~~3~~	~~13~~
4	3

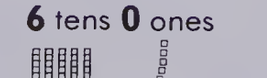
tens	ones
~~7~~	~~18~~
8	8

Add.

36 + 9 = 45	55 + 6 = 61	21 + 38 = 59	59 + 17 = 76	28 + 45 = 73

Make a trade to get more ones.

6 tens **0** ones



5 tens 10 ones

tens	ones
4	12
~~5~~	~~2~~

tens	ones
2	16
~~3~~	~~6~~

Subtract.

53 − 8 = 45	46 − 7 = 39	57 − 16 = 41	92 − 58 = 34	80 − 27 = 53

Add or subtract.

47 + 23 = 70	92 − 18 = 74	46 − 19 = 27	29 + 34 = 63	70 − 23 = 47

UNIT 10 LESSON 1

Objective A38

Add and subtract two-digit numbers, without regrouping.

Vocabulary

Tens, ones, sum, difference, estimate
Direction words: Find a group of ten.

Materials

Egg cartons
Scissors
Counters
Number line to 100

Introducing the Lesson

Provide each student with an egg carton. Have them open it and cut off the top two egg holders. Show the students how to use the ten holder. Ask them to place the lids of the cartons on the left and the egg holders on the right. Explain that when the ten spaces are full, the counters must be flipped over onto the lid to make a "ten". Practise oral counting as the students add one counter at a time until a ten is made. Continue adding to make 10 + 1 (eleven), 10 + 2 (twelve), 10 + 3 (thirteen), etc. up to 19.

Teaching the Lesson

Record 7 + 5 on the chalkboard. Ask the students to put 7 counters in their egg holders and to get 5 more ready. Add these to the egg holders one at a time. When ten slots are full, flip the counters to the lid and add the last two counters to the egg holders. Discuss 7 + 5 as 12 or as ten and two. Repeat with other sums.

Record the sum for each as it is completed. Record also the number of tens and ones for each.

tens	ones

Review adding and subtracting 2 two-digit numbers without regrouping by aligning tens and ones on a chalkboard place value grid. Show how the ones are added or subtracted first, then the tens. Make up number stories for the students to record and add.

UNIT 10 Name _____



Add.

35 + 24 = 59	61 + 15 = 76	42 + 7 = 49	30 + 25 = 55	73 + 26 = 99
40 + 30 = 70	16 + 31 = 47	55 + 22 = 77	37 + 40 = 77	52 + 35 = 87

Subtract.

68 − 24 = 44	75 − 12 = 63	84 − 61 = 23	35 − 15 = 20	67 − 26 = 41
43 − 20 = 23	68 − 32 = 36	49 − 23 = 26	48 − 38 = 10	26 − 12 = 14

Add or subtract. Watch the signs.

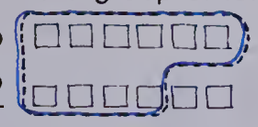
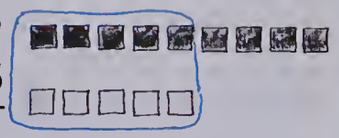
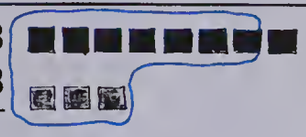
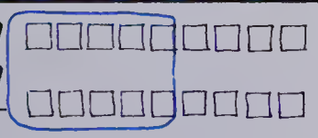
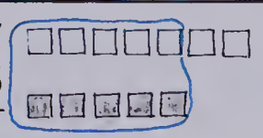
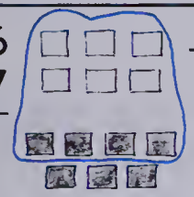
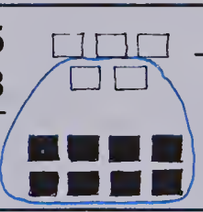
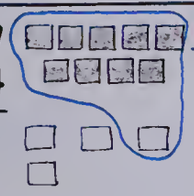
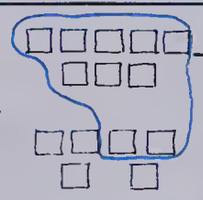
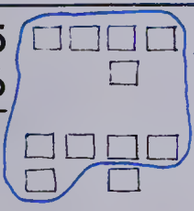
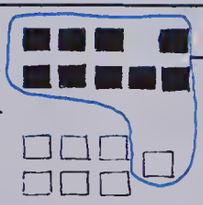
35 − 21 = 14	46 + 12 = 58	54 − 32 = 22	71 + 16 = 87	68 − 35 = 33

Two-place addition and subtraction one hundred ninety-three 193

Using the Pages

- On page 193, remind the students to deal with the ones first and to notice the signs.
- Do several examples on page 194 with the students. Encourage them to use their ten holder if it helps them find a ten.

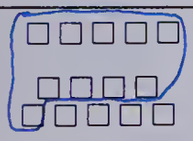
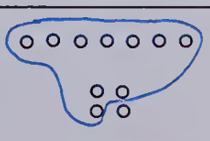
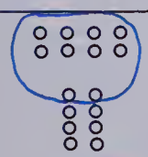
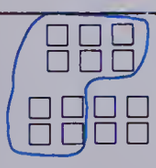
Add. Find a group of ten.

6 + 6 = 12  1 ten 2 ones	9 + 5 = 14  1 ten 4 ones
8 + 3 = 11  1 ten 1 ones	7 + 8 = 15  1 ten 5 ones
9 + 9 = 18  1 ten 8 ones	7 + 5 = 12  1 ten 2 ones
6 + 7 = 13  tens 1, ones 3	5 + 8 = 13  tens 1, ones 3
9 + 4 = 13  tens 1, ones 3	8 + 6 = 14  tens 1, ones 4
5 + 6 = 11  tens 1, ones 1	9 + 7 = 16  tens 1, ones 6

Extra Practice **Worksheet A38**

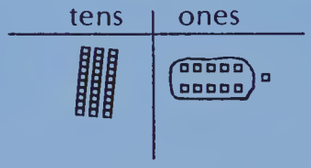
Pages 193-194

Add. Find a group of ten.

5 + 9 = 14  tens 1, ones 4	7 + 4 = 11  tens 1, ones 1
8 + 8 = 16  tens 1, ones 6	5 + 7 = 12  tens 1, ones 2
6 + 8 = 14  tens 1, ones 4	9 + 8 = 17  tens 1, ones 7

Reinforcement

1. Have dice, counters that join, and a tens and ones chart ready. Give each student a chance to roll and add that number of counters to the ones side. (A two-digit starting number is already stated.) If a group of ten can be made, the students clap. A ten stick is then made (see below) and the students tell how many there are in all. For example, "Start with 35; roll a 6. Find a ten. Now there are 4 tens and 1 one, or 41 in all."



2. Have students *estimate* sums on the number line. Record 35 + 24 = ___. Ask the students to guess whether the sum will be closer to 40, 50, or 60. Start at 35 on the number line and jump (10 + 10 + 4) to 59. Record the addition. Compare the sum to the estimate and to the number line jumps. Repeat.

Provide a similar number line activity for subtracting to find differences.

Enrichment

Ask the students to colour a row of squares on graph paper in two colours to show 7 + 8. Then ask them to match the same length by colouring an addition with 10 as one of the addends.



UNIT 10 LESSON 2

Objective A39

Rename tens and ones by finding another ten.

Vocabulary

Find a ten, rename
Direction words: Trade to get more tens.

Materials

Buttons or bottle caps
Paper plates
Place value mats*
Plastic bags and twist ties

Introducing the Lesson

Choose three to five students to be helpers. Spread out a collection of buttons (or bottle caps) in several piles. Ask the students to find sets of ten in a pile and to put each set on a paper plate. Have them find as many sets of ten as possible. To identify the number of objects in all, ask the students to count tens and ones, record them on the chalkboard, and read the numeral aloud.

____ tens ____ ones ____ in all

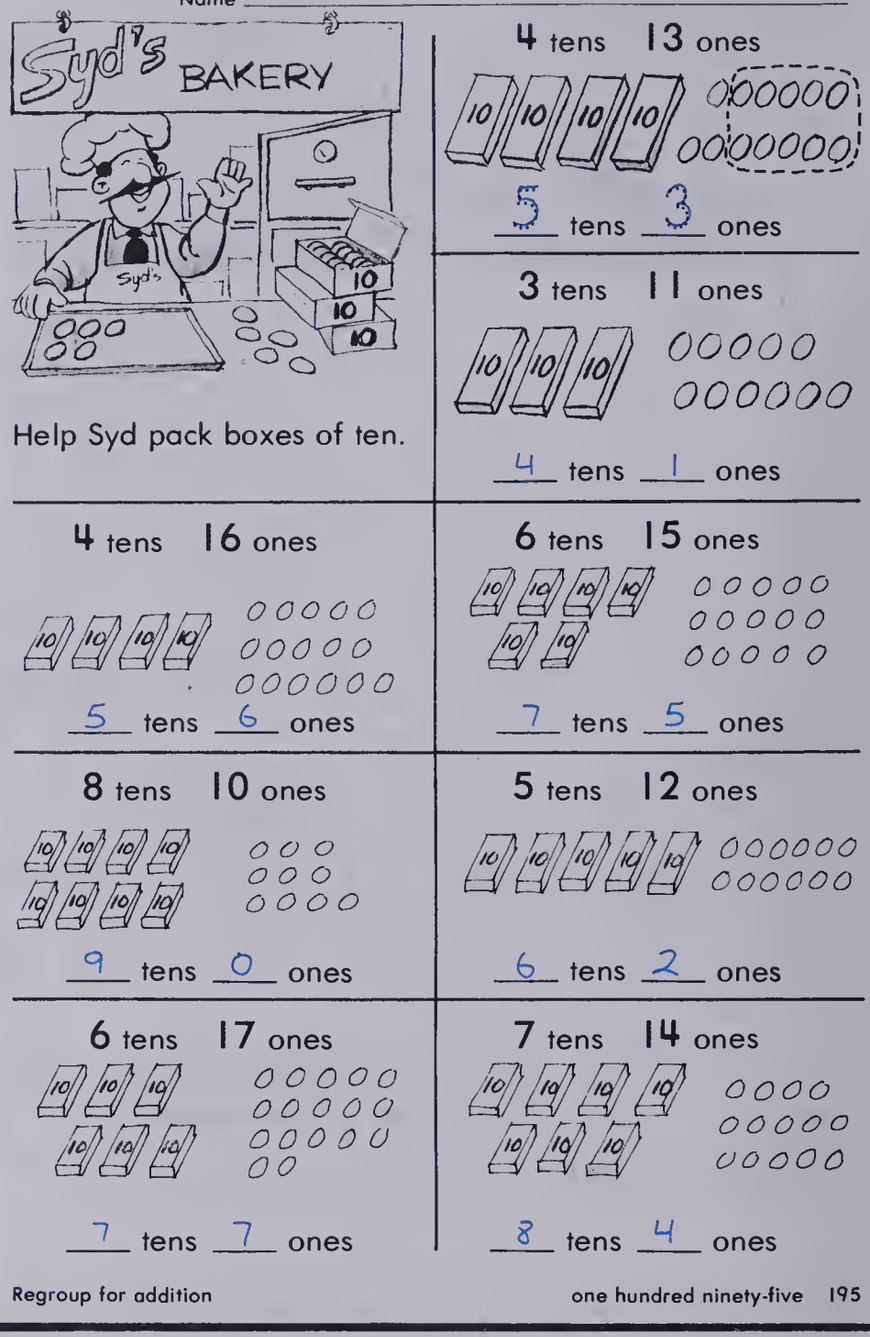
Teaching the Lesson

Choose other students as helpers to do the same activity as above. After each set of ten is collected, discuss whether or not another ten can be collected. Record several names for the same set of objects, showing the number of tens and ones, until the standard name appears. Emphasize the finding of another ten.

~~2~~ tens ~~25~~ ones
~~3~~ tens ~~15~~ ones
4 tens 5 ones

45

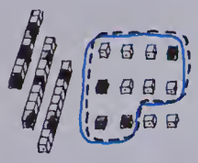
Use a place value mat, plastic bags, and approximately 35 counters. Ask the students to find tens, bag them, and place them on the tens side of the mat. After each ten is made, describe the collection on the mat, e.g., "We have one group of ten and lots of leftovers. Can we find another ten? Now we have 3 tens and 5 ones. How many is that in all?"



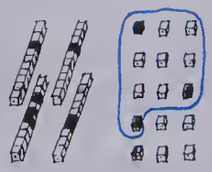
Using the Pages

- Most of page 195 can be used as an oral guided lesson. Some students may prefer to model the examples with counters.
- Help the students get started with page 196 by doing several examples on the chalkboard. For the bottom half of the page, some students may require counters and/or teacher supervision to further reinforce the concepts and vocabulary.

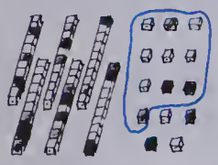
How many tens and ones?
Trade to get more tens.



tens	ones
~~3~~ 4	~~12~~ 2



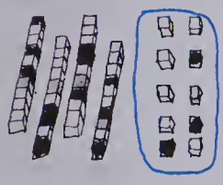
tens	ones
~~4~~ 5	~~15~~ 5



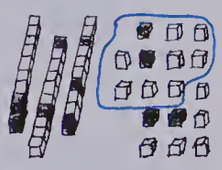
tens	ones
~~6~~ 7	~~14~~ 4



tens	ones
~~5~~ 6	~~18~~ 8



tens	ones
~~4~~ 5	~~10~~ 0



tens	ones
~~3~~ 4	~~17~~ 7

tens	ones
~~4~~ 5	~~12~~ 2

tens	ones
~~6~~ 7	~~15~~ 5

tens	ones
~~3~~ 4	~~18~~ 8

tens	ones
~~1~~ 2	~~13~~ 3

tens	ones
~~8~~ 9	~~16~~ 6

tens	ones
~~8~~ 9	~~10~~ 0

tens	ones
~~7~~ 8	~~14~~ 4

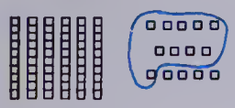
tens	ones
~~5~~ 6	~~11~~ 1

tens	ones
~~2~~ 3	~~10~~ 0

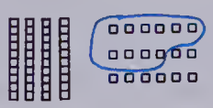
Extra Practice

Worksheet A39
Pages 195-196

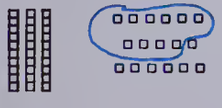
How many tens and ones?
Trade to get more tens.



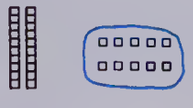
tens	ones
~~6~~ 7	~~14~~ 4



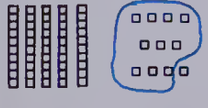
tens	ones
~~4~~ 5	~~18~~ 8



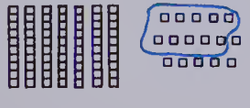
tens	ones
~~3~~ 4	~~17~~ 7



tens	ones
~~2~~ 3	~~10~~ 0



tens	ones
~~5~~ 6	~~11~~ 1



tens	ones
~~7~~ 8	~~16~~ 6

Reinforcement

1. Provide the students with place value mats and counters. Give directions, e.g., "Put 2 tens and 7 ones on your mat. Can you find another ten? How many counters do you have in all?" *Twenty-seven*. "Now put 2 tens and 15 ones on your mat. Can you find another ten? Put it with the tens. Now how many ones are left? How many tens? How many counters in all?"

2. Show collections made up of a plastic bag filled with ten counters and lots of left over counters. Ask the students to find more tens, bag them, and then tell how many counters there are in all.

Enrichment

For students who have no difficulty with renaming, ask them to rename two-digit numbers on a place value chart and then trade their list with a partner. Each student then tries to find the corresponding standard numeral.

28 → | tens | ones | → 28

tens	ones
1	18

UNIT 10 LESSON 3

Objective A40

Add a one- and a two-digit number, with regrouping.

Vocabulary

Find a ten, tens, ones

Materials

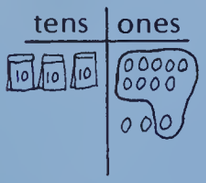
Place value mats*
Place value blocks

Introducing the Lesson

Ask the students to model 26 using place value blocks and mats. Record the addition on the chalkboard. Ask the students to add 6 more blocks on the ones side. "How many ones are there in all?" *Twelve.* "Can a group of ten be made?" Have the students group 10 ones and move it to the tens side. Record how many ones and tens in all. During this activity, emphasize the renaming step and show how we can record tens and ones in several ways. Only one way, however, represents the standard numeral.

Teaching the Lesson

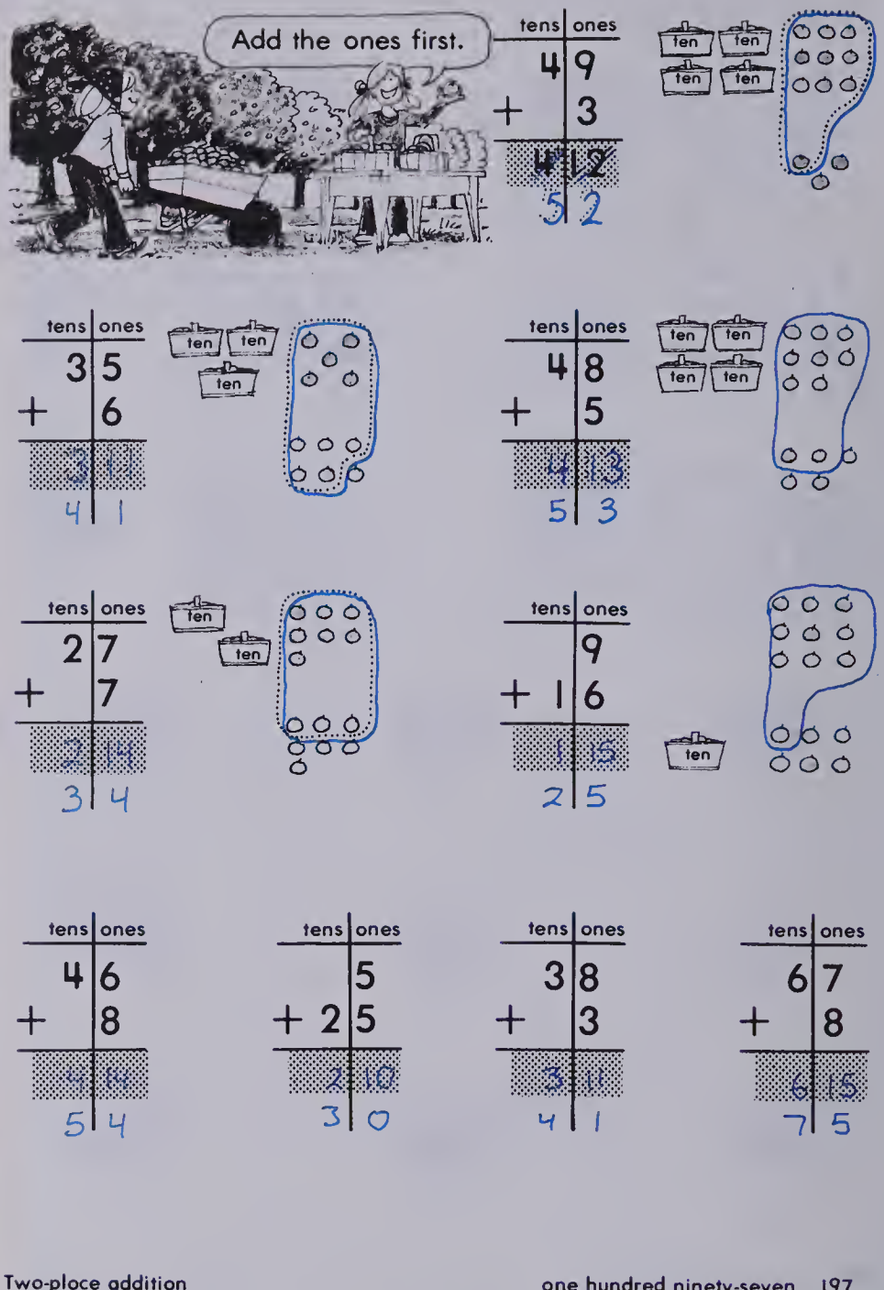
Follow the same procedure as above using illustrations.



tens	ones
3	9
+	3
~~3~~	~~12~~
4	2

Review finding a ten when adding sums between 10 and 18: 6 + 6 = 10 + ___ or 9 + 4 = 10 + ___. Do this activity orally in preparation for renaming tens and ones.

Record 58 + 6, vertically, on the chalkboard. Draw, or use blocks, to model the example. Look at the ones first. Say, "Eight plus six or ten plus four." Show the shortcut for recording the single 10 above the 5 tens and record 4 in the ones place. Model this renaming step by placing the new group of ten above the original 5 tens. Then add the tens. Repeat with several examples.



Two-ploce addition

one hundred ninety-seven 197

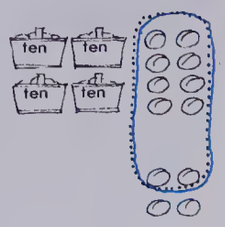
Using the Pages

- Complete page 197 as an oral guided lesson. This page is meant as an intermediate recording step in the development of the addition algorithm. For students who have already had experience with trading or regrouping, this step may not be essential. Correspondingly, students who have difficulty with this may need extra practice at this stage before going on to the more abstract recording shown on page 198.
- Do the exercise at the top of page 198 orally. Assign the bottom exercise for independent practice.

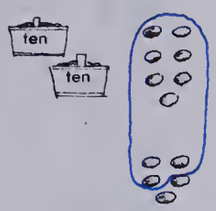


Look for another ten.
Add it to the tens.

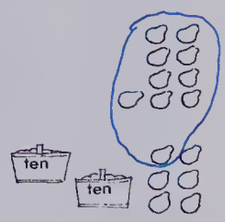
tens	ones
1	
4	8
+	4
5	2



tens	ones
1	
2	7
+	5
3	2



tens	ones
1	
	9
+ 2	6
3	5



Add.

tens	ones
1	
4	6
+	6
5	2

tens	ones
1	
	8
+ 2	4
3	2

tens	ones
1	
5	7
+	7
6	4

tens	ones
1	
3	9
+	3
4	2

	9
+	34
	43

	47
+	5
	52

	78
+	8
	86

	25
+	5
	30

	26
+	5
	31

	38
+	9
	47

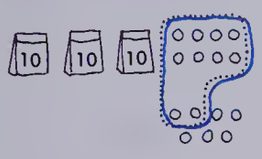
	6
+	57
	63

	47
+	3
	50

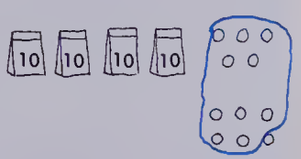
Extra Practice **Worksheet A40**
Pages 197-198

Add the ones first.

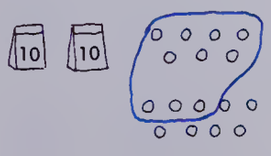
tens	ones
1	
3	8
+	7
4	5



tens	ones
1	
4	5
+	6
5	1



tens	ones
1	
2	7
+	9
3	6



tens	ones
1	
	5
+ 5	7
6	2



Reinforcement

Provide a number line for the students to count on and to check their sums for pages 197 and 198. They should start with the two-digit number and add on the one-digit number. This activity helps to relate a relatively unfamiliar algorithm to a familiar counting context and helps develop an ability to assess the reasonableness of a sum.

Enrichment

Provide three dice marked 4, 5, 6, 7, 8, and 9. Ask the students to roll them and then form an addition similar to the following.

4	6
+	9

The example is then copied onto paper and added. To increase the difficulty, set a goal for the answer, e.g., 50. Students must try to arrange the dice to get an answer as close to 50 as possible.

4	6
+	9

9	6
+	4

6	9
+	4

UNIT 10 LESSON 4

Objective A41

Add 2 two-digit numbers, with regrouping.

Vocabulary

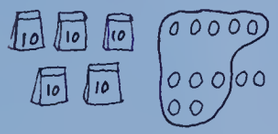
Regroup, tens, ones, sum, estimate

Materials

"Potatoe" counters
Plastic bags and twist ties

Introducing the Lesson

Ahead of time, have helpers count out sets of 35, 27, 48, 16, 29, and 15 "potatoe" counters. Using two of the sets, ask the students to bag groups of ten potatoes in each set and label the sets with the appropriate standard numeral. "Let's add the two sets." Ask if there are enough ones to make another ten. Bag it. Record the addition and show the regrouped ten and the leftover ones.



tens	ones
1	
3	5
+ 2	7
6	2

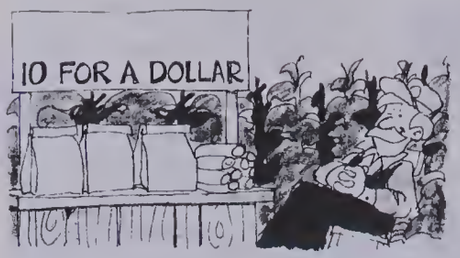
Repeat with other combinations of sets.

Teaching the Lesson

Provide a paper and pencil for each student. Show them how to draw a potatoe bag to represent ten and a single potatoe to represent one. Ask the students to draw potatoe bags and single potatoes to represent 27 potatoes. Then, underneath, have them draw a representation of 37 potatoes. Ask for an estimate of how many potatoes there are in all. Then have the students try to find another group of ten and circle it. Record the computation for the students. Compare the sum with the estimate.

Record a similar addition on the chalkboard. Have the students make a potatoe drawing from the addition, as explained above, and then record the sum. Emphasize adding ones first, looking for another ten, and then adding tens.

Name _____



tens	ones
3	7
+ 2	5
6	2

tens	ones
3	5
+ 4	6
8	1

tens	ones
4	8
+ 2	7
7	5

tens	ones
1	8
+ 2	4
4	2

tens	ones
2	6
+ 5	4
8	0

tens	ones
6	9
+ 1	3
8	2

tens	ones
5	7
+ 2	5
8	2

tens	ones
4	6
+ 3	6
8	2

tens	ones
3	4
+ 5	2
8	6

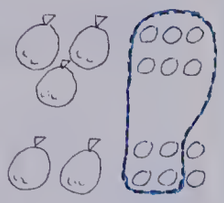
Using the Pages

- Do several examples on page 199 with the students. Point out the two sets of corn (37 and 25) in the illustration of the first example. Add the ones first (7 + 5 or 10 + 2). Record the ten in the tens column and then record the ones. Add the tens to find 62 in all. Count the model to check. *Ten, twenty, thirty, forty, fifty, fifty-one, fifty-two, . . ., sixty-two.*
- Help the students get started with page 200 by using the procedure described in the lesson.



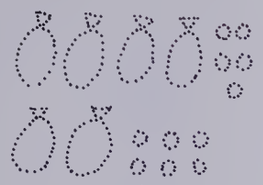
= 10 potatoes

tens	ones
1	
3	6
+ 2	6
6	2



Draw the potatoes. Add. Find another ten.

tens	ones
1	
4	5
+ 2	6
7	1



tens	ones
1	
2	9
+ 1	4
4	3

tens	ones
1	
2	7
+ 4	7
7	4

tens	ones
1	
3	5
+ 2	8
6	3

tens	ones
1	
6	4
+ 2	7
9	1

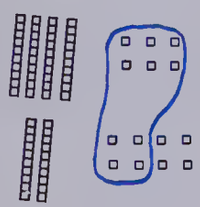
tens	ones
5	6
+ 3	2
8	8

Extra Practice

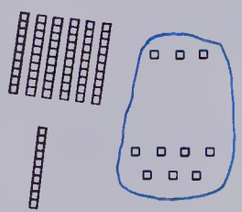
Worksheet A41
Pages 199-200

Add. Find another ten.

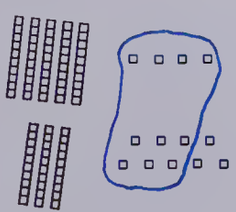
tens	ones
1	
4	6
+ 2	8
7	4



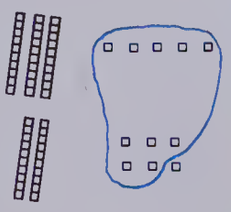
tens	ones
1	
6	3
+ 1	7
8	0



tens	ones
1	
5	4
+ 3	9
9	3



tens	ones
1	
3	5
+ 2	6
6	1



Reinforcement

Make a list of two-digit numbers, such as children's masses, class sizes, people's ages, etc. Use these numbers for practice with addition in a problem solving context.

Mass in kilograms	
Peter	28 kg
Randy	36 kg
Ann	33 kg
Pandit	29 kg
Michelle	25 kg
Kelly	27 kg
Leigh	30 kg

Find the total mass in kilograms for:

1. Randy and Pandit
2. Kelly and Leigh
3. Michelle and Kelly
4. Randy and Ann
5. Ann and Randy

Enrichment

Use the same list as above for these questions.

1. Which pairs have the greater mass?
a. Pandit and Kelly or Leigh and Michelle?
b. Randy and Michelle or Peter and Ann?

2. Can you find two pairs with the same mass?

UNIT 10 LESSON 5

Objective A42

Add 2 two-digit numbers, with and without regrouping.

Vocabulary

Sum, trade, regroup, estimate

Materials

Numeral Cards 0 to 9
Number line to 100

Introducing the Lesson

Place two sets of numeral cards face down on a table. One set has numerals 1 to 4. The other has numerals 0 to 9. Ask each of two students to select a card from the first set and record that numeral in a *tens-place* square of a 2 by 2 chalkboard grid. Have each of two other students select a card from the second set and record the numeral in the ones place. Have them add the ones and then the tens. Show how to rearrange the numerals and add again (making sure three-digit sums do not arise).

+	3	8
	2	1

+	3	8
	1	2

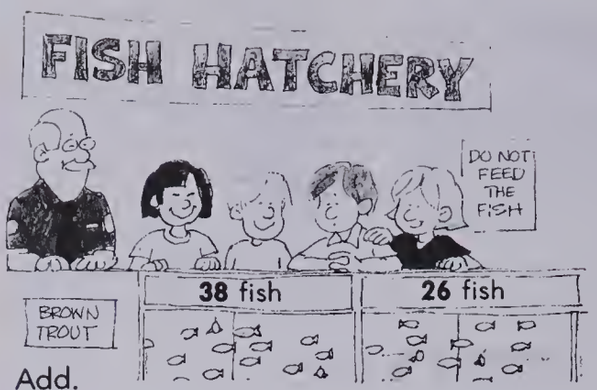
+	8	3
	1	2

Teaching the Lesson

Describe simple problem situations involving addition of two-digit numbers. Have several students work at the chalkboard to compute the answers. Check each example together, emphasizing the regrouping of ones to tens and the alignment of ones and tens. Use the students' names and a humorous context for the problem situations.

At first, use place value charts to align the tens and ones for the chalkboard problems. Later, omit the charts. Emphasize that not all addition examples require trading. Use examples of both types, regrouping and not regrouping. For some problem situations, ask the students to estimate the sum. Use a number line to illustrate one method of providing a visual aid for estimating.

Name _____



tens	ones
1	
3	8
+ 2	6
6	4

64 fish in all

Add.

tens	ones		tens	ones		tens	ones		tens	ones
6	5		4	6		2	9		3	9
+ 2	7		+ 1	8		+ 5	3		+ 2	8
9	2		6	4		8	2		6	7

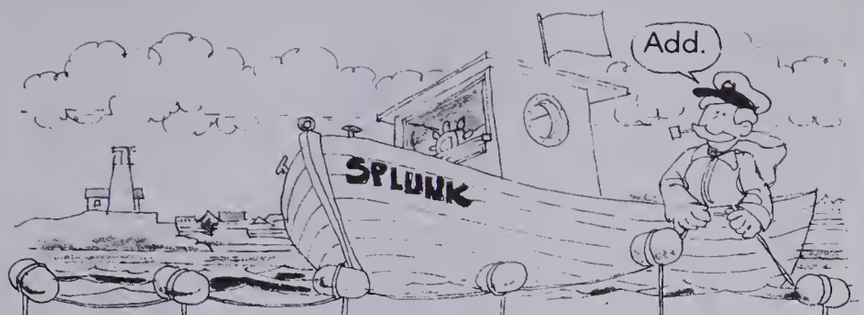
tens	ones		tens	ones		tens	ones		tens	ones
6	8		1	4		4	9		6	7
+ 1	5		+ 2	8		+ 2	5		+ 1	9
8	3		4	2		7	4		8	6

25	35	48	33
+ 46	+ 45	+ 21	+ 58
71	80	69	91

23	44	77	55
+ 69	+ 13	+ 19	+ 26
92	57	96	81

Using the Pages

- Discuss the problem in the illustration on page 201 and how to solve it using addition with regrouping. Assign the page as independent work.
- Assign page 202 as independent work. For a fun activity, students can colour the fish net rectangles green for odd sums and blue for even sums.



1 24 + 37 61	56 + 24 80	38 + 7 45	64 + 20 84	15 + 75 90
63 + 19 82	48 + 24 72	57 + 17 74	38 + 25 63	58 + 11 69
65 + 29 94	8 + 16 24	21 + 37 58	18 + 49 67	26 + 56 82
19 + 49 68	30 + 29 59	45 + 46 91	38 + 22 60	17 + 16 33

Extra Practice

Worksheet A42
Pages 201-202

Add.

tens	ones	tens	ones	tens	ones	tens	ones
1				1		1	
6	4	4	3	1	8	2	8
+ 2	9	+ 3	5	+ 5	7	+ 4	2
9	3	7	8	7	5	7	0

tens	ones	tens	ones	tens	ones	tens	ones
1		1				1	
1	9	3	8	3	1	5	5
+ 3	9	+ 5	6	+ 3	8	+ 2	9
5	8	9	4	6	9	8	4

Reinforcement

1. Make a list of phone numbers (Make sure the sums of the first two digits and last two digits do not exceed 99.). Have the students make their own addition examples by adding the first and last two numbers from phone numbers of their choice. Check answers together. Record them on a separate list for future use.

261-8437 → 26
+37

2. Have small groups of students do the numeral card activity described in Introducing the Lesson.

Enrichment

In one phone number, have the students look for two pairs of numbers that make the greatest sum which is not above 99.

261-8437 → 61
+37
98

UNIT 10 LESSON 6

Objective A43

Subtract from numbers to 18; regroup for subtraction.

Vocabulary

Subtract, difference, trade a ten

Materials

Place value blocks
Die

Introducing the Lesson

Print 13 on the chalkboard. Ask a student to come up and model 13 with tens and ones place value blocks. Print 13 – 5. Ask another student to come up and subtract five. Count aloud as five blocks are subtracted to emphasize that two blocks must also be taken from the group of ten. Record the difference.



13 – 5 = 8

Repeat with other similar examples.

Teaching the Lesson

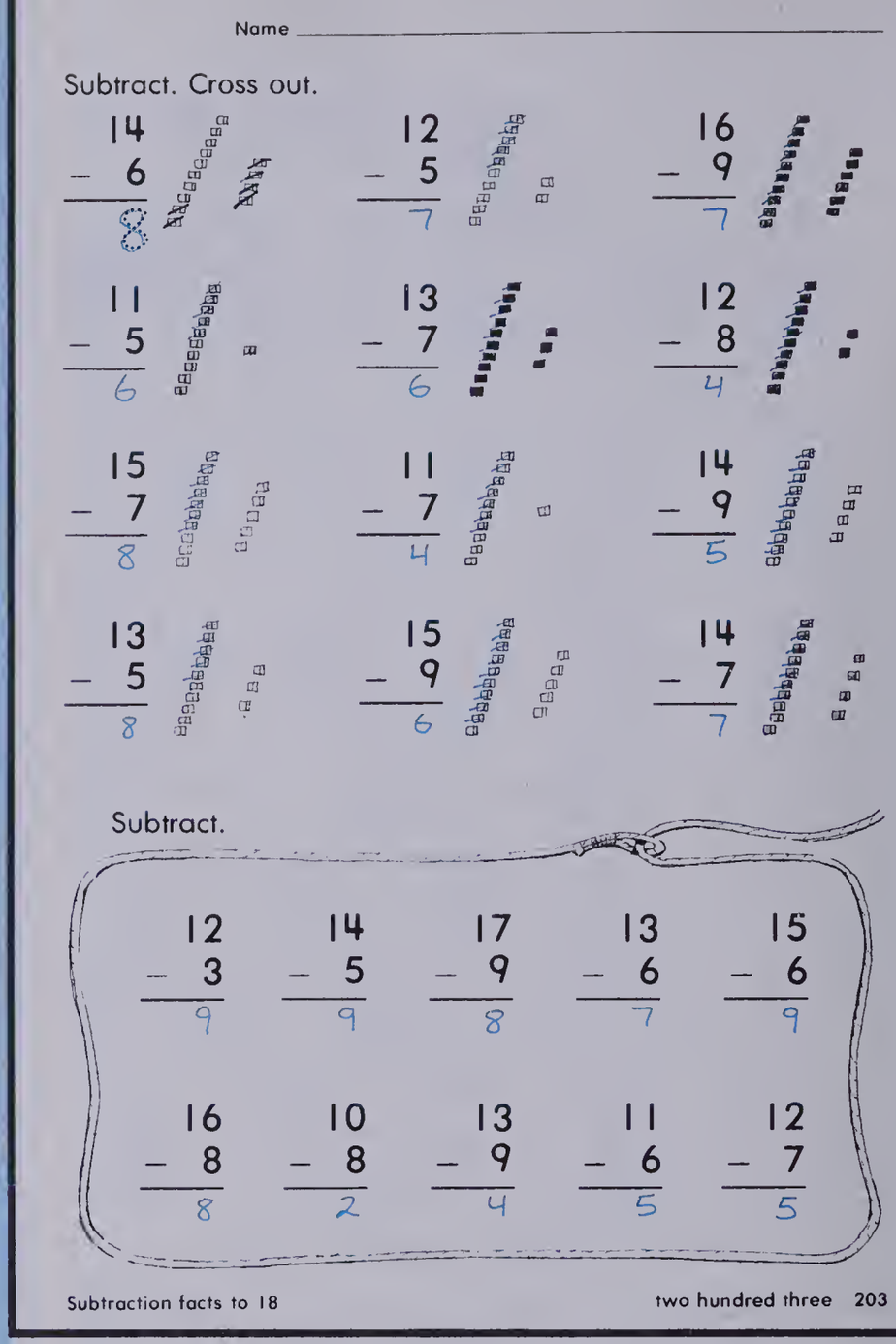
Review fact families and show how addition facts can help with subtraction.

5, 7, 12 5 + 7 = 12 12 – 7 = 5
7 + 5 = 12 12 – 5 = 7

Record 15 – 9 = ___ on the chalkboard. Ask, "What goes with 9 to get 15 in all?" Record 9 + 6 = 15. Use this fact to complete the subtraction example. Repeat. (At this point, the students can complete page 203.)

Place 5 tens rods on a table. Give a student a die to roll. The student rolls the die and removes that number of cubes from the 5 tens rods. Point out how a ten must be *traded* for 10 ones to allow the cubes to be taken. Repeat. Give each student a turn rolling, trading (if necessary), and removing cubes as indicated on the die. Continue until no rods or cubes are left.

Show 3 tens rods and 2 ones cubes. Ask a student to *trade a ten* to get more ones. Record the new amounts of tens and ones on the chalkboard. Repeat with other examples as on page 204.



Name _____

Subtract. Cross out.

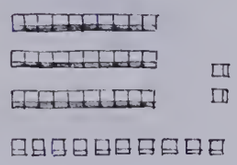
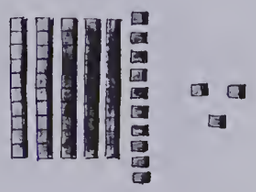
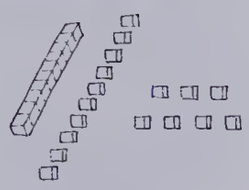
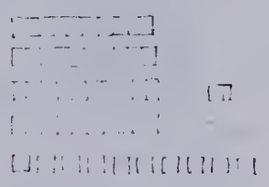
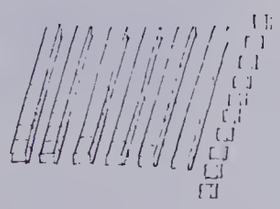
14 − 6 = 8	12 − 5 = 7	16 − 9 = 7
11 − 5 = 6	13 − 7 = 6	12 − 8 = 4
15 − 7 = 8	11 − 7 = 4	14 − 9 = 5
13 − 5 = 8	15 − 9 = 6	14 − 7 = 7

Subtract.

12 − 3 = 9	14 − 5 = 9	17 − 9 = 8	13 − 6 = 7	15 − 6 = 9
16 − 8 = 8	10 − 8 = 2	13 − 9 = 4	11 − 6 = 5	12 − 7 = 5

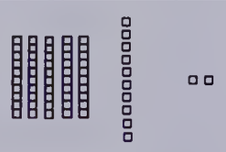
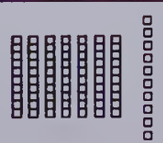
Using the Pages

- On page 203, encourage the students to use addition fact combinations to recognize the subsets of the starting set.
- Do several examples on page 204 with the students. Use materials to do the trading if necessary.

Start with:	Trade a ten.	Now you have:
3 tens 5 ones		2 tens 15 ones
4 tens 2 ones		3 tens 12 ones
6 tens 3 ones		5 tens 13 ones
2 tens 7 ones		1 tens 17 ones
5 tens 1 one		4 tens 11 ones
7 tens 0 ones		6 tens 10 ones

Extra Practice **Worksheet A43**

Pages 203-204

Start with:	Trade a ten.	Now you have:
6 tens 2 ones		5 tens 12 ones
4 tens 3 ones		3 tens 13 ones
8 tens 0 ones		7 tens 10 ones

Reinforcement

1. Provide small groups of students with dice and 3 tens rods to play the game described in Teaching the Lesson. Have the students take turns rolling the die and removing cubes from the starting set of 30. Encourage each group to be the first to get rid of all rods and cubes.

2. Provide subtraction flash cards for practice with subtracting from numbers to 18.

Enrichment

Have the students work independently with 3 tens rods and a die. Encourage them to record each trade and then each subtraction until there are no rods or cubes left.

tens	ones	Subtract:
~~3~~	~~8~~	
~~2~~	~~10~~	−4
~~2~~	~~6~~	−3
~~2~~	~~3~~	−5
1	8	

UNIT 10 LESSON 7

Objective A44

Subtract a one-digit number from a two-digit number, with regrouping.

Vocabulary

Trade a ten
Direction words: Trade a ten to get more ones.

Materials

Place value blocks
Plastic bags and twist ties
Counters

Introducing the Lesson

Play "Can You Do It?" using tens and ones place value blocks. Show 2 tens rods and 5 ones cubes. "How many in all?" Record 25 on the chalkboard. Ask a student to subtract 3 cubes. "How many are left?" Have another student subtract 8 cubes from 25. Let the student show how a tens rod is traded for 10 ones cubes as the subtraction is done. Repeat, always starting with 25.

Teaching the Lesson

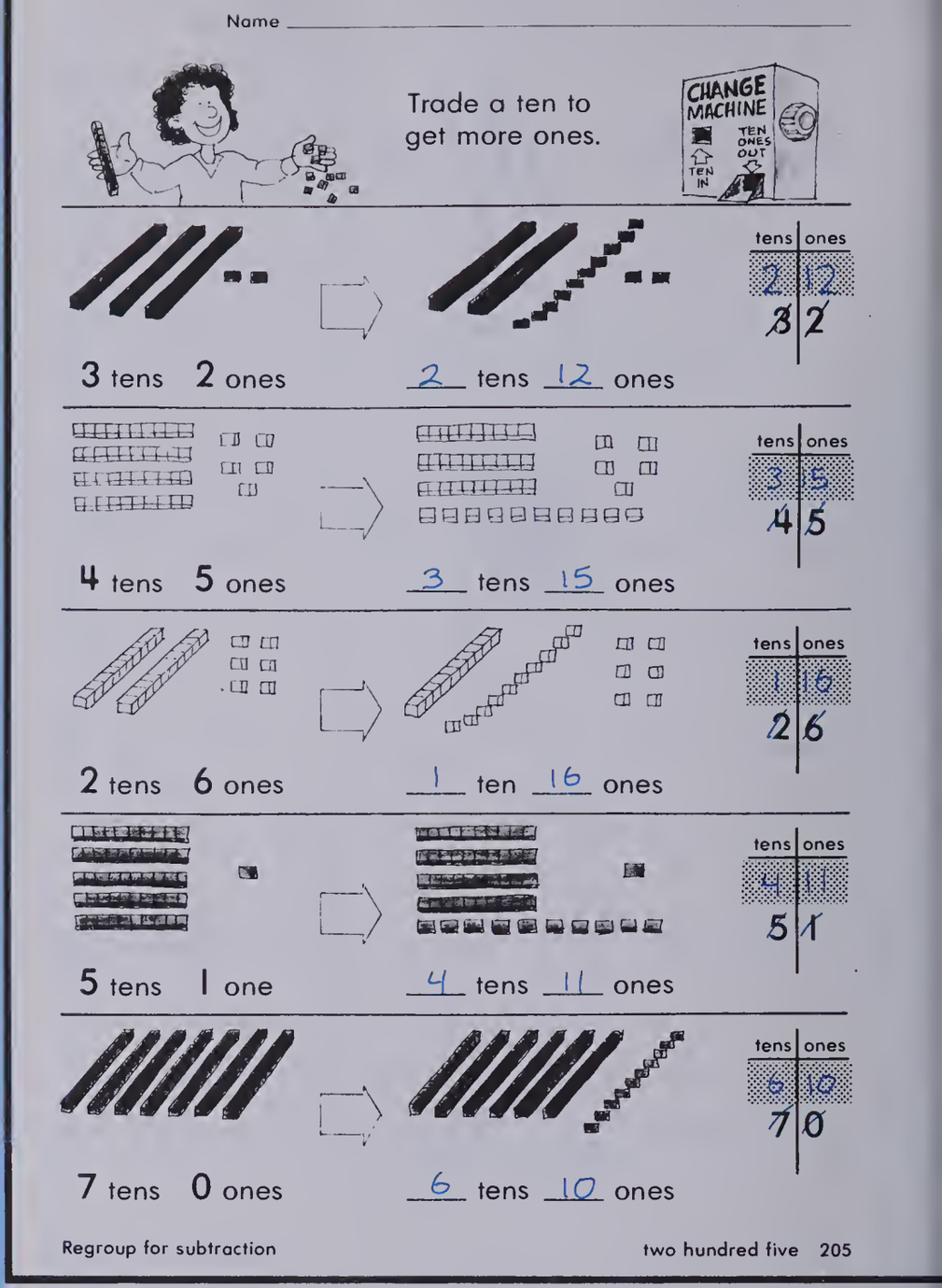
Model 42 using bags of ten counters and loose counters. Record 4 tens and 2 ones on the chalkboard. Ask a student to trade to get more ones. Record the trade on a place value chart. Repeat with other examples.



4 tens 2 ones 3 tens 12 ones

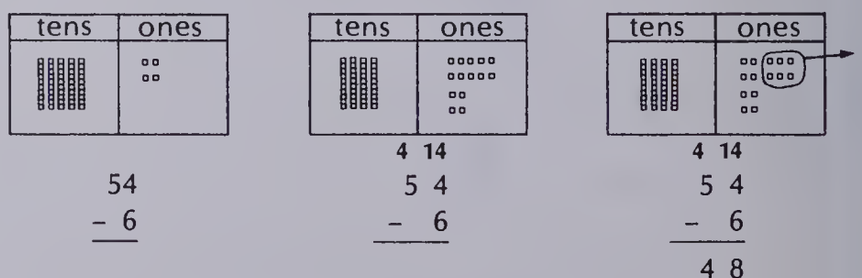
tens	ones
3	12
~~4~~	~~2~~

At this point, you may decide to provide more renaming practice using place value materials before proceeding with the subtraction examples on page 206.

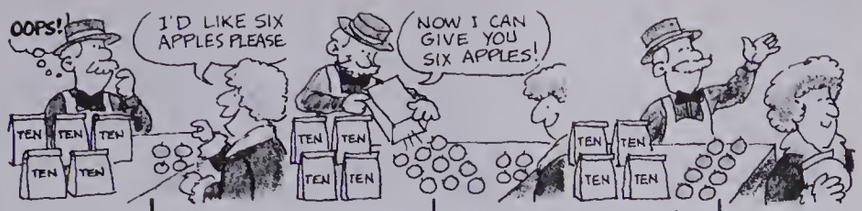


Using the Pages

- Do pages 205 and 206 as guided group activities in conjunction with the use of place value materials. For example, after reading and discussing the problem at the top of page 206, have the students model it with place value materials as you record the trade and the subtraction.



For each example on the page, emphasize these three steps.
1. Do we need to trade in order to subtract?
2. Trade a ten to get more ones. Record the trade.
3. Subtract ones, then tens.

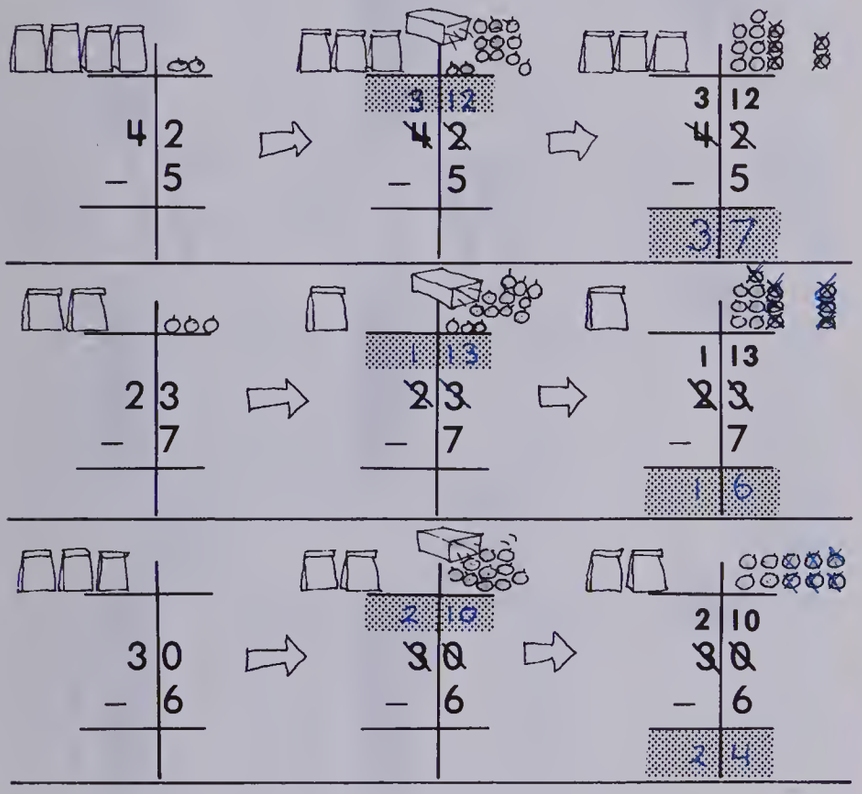


tens	ones
5	4
−	6

tens	ones
4	14
5	4
−	6

tens	ones
4	14
5	4
−	6
4	8

Start with: Trade: Subtract the ones first.



4 2	3 12	3 12
4 2	4 2	4 2
− 5	− 5	− 5
		3 7
2 3	1 13	1 13
2 3	2 3	2 3
− 7	− 7	− 7
		1 6
3 0	2 10	2 10
3 0	3 0	3 0
− 6	− 6	− 6
		2 4

Extra Practice **Worksheet A44**
Pages 205-206

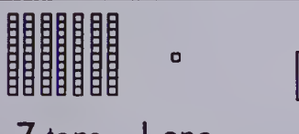
Trade a ten to get more ones.



5 tens 4 ones

4 tens 14 ones

tens	ones
4	14
5	4



7 tens 1 one

6 tens 11 ones

tens	ones
6	11
7	1



6 tens 2 ones

5 tens 12 ones

tens	ones
5	12
6	2

Reinforcement

Use dimes and pennies for trading practice. Provide a small group of children with a tens and ones mat and three dimes each. Put a collection of pennies in the middle as a "bank". Each student takes a turn rolling a die and paying that amount to the teacher. If the student needs to trade a dime for ten pennies in order to pay, the student turns in a dime to the bank and takes ten pennies in trade. The first or last student to run out of money can be the winner.

Enrichment

Have the students record their work for the above game. For example:

2 10		
3 0	26	25
− 4	− 1	− 3
2 6	25	22
1 12		
2 2	16	11
− 6	− 5	−3
1 6	11	8

UNIT 10 LESSON 8

Objective A45

Subtract 2 two-digit numbers, with regrouping.

Vocabulary

Trade a ten, estimate

Materials

Plastic bags and twist ties
Counters

Introducing the Lesson

Demonstrate two-digit subtraction using 6 plastic bags filled with 10 counters each and 4 loose counters. Ask if you can subtract 3 counters without trading. Then ask if you can subtract 23 counters without trading. Model and record the subtraction.

Start again with 64. Ask if you can subtract 7 or 27 without trading. Model the trades, subtract, and record. Repeat, using students to subtract and record.

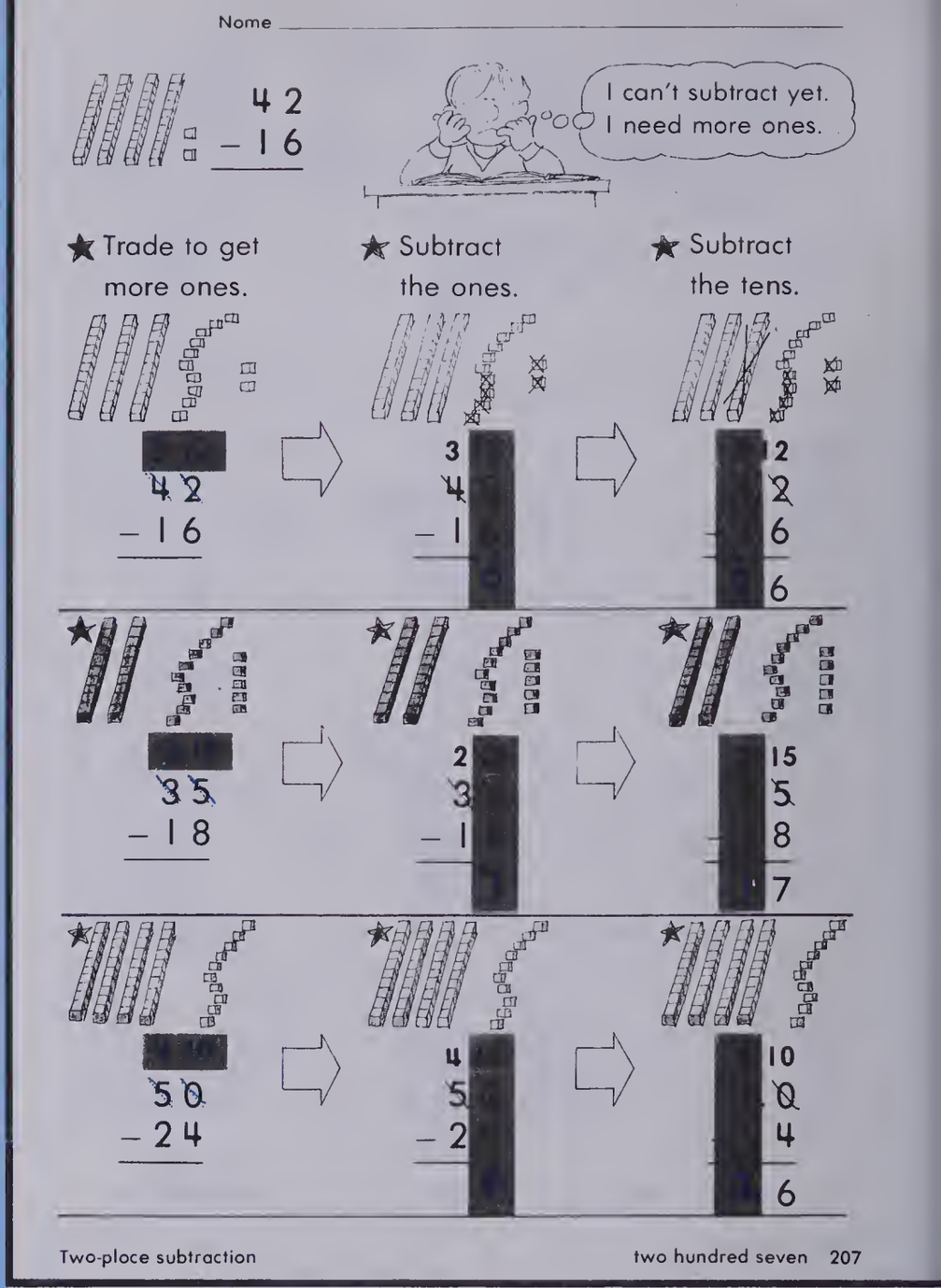
Teaching the Lesson

Print the following on the chalkboard and ask:

$$\begin{array}{r} 42 \\ -16 \\ \hline \end{array}$$

a. "What are we starting with?"
b. "What are we subtracting?"
c. "Do we subtract ones or tens first?"
d. "Do we have enough ones?"
e. "Is a trade needed?"
f. "After subtracting the ones, how many ones are left?"
g. "After subtracting the tens, how many tens are left?"
h. "How many are left?"
Repeat the above format using oral problem situations. "I had 63 stickers. I put 49 of them in my sticker book. How many are left?"

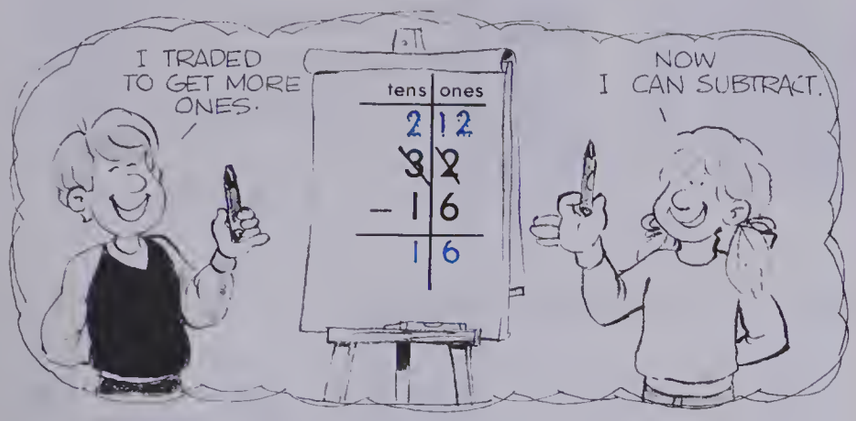
Encourage students to estimate answers before applying the algorithm. Include examples where no renaming is required to emphasize the question, "Do I need to make a trade?"



Using the Pages

- Page 207 should be done as a guided lesson. Provide materials to model each example.
- Do several examples on page 208 as a group. Use the chalkboard to model the trade. Be sure to include an example from the last row on the page having zero in the minuend.

Trade to get more ones.
Subtract the ones, then the tens.



tens	ones
4	13
5	3
- 2	7
2	6

tens	ones
5	11
6	1
- 3	4
2	7

tens	ones
2	15
3	5
- 1	8
1	7

tens	ones
1	17
2	7
- 1	9
	8

tens	ones
3	13
4	3
- 2	4
1	9

tens	ones
2	12
3	2
- 1	8
1	4

tens	ones
5	11
6	1
- 3	5
2	6

tens	ones
4	13
5	3
- 4	7
	6

tens	ones
5	10
6	0
- 2	4
3	6

tens	ones
4	10
5	0
- 1	8
3	2

tens	ones
6	10
7	0
- 3	5
3	5

tens	ones
3	10
4	0
- 2	6
1	4

Extra Practice

Worksheet A45
Pages 207-208

Trade to get more ones.
Subtract the ones and then the tens.

tens	ones
3	16
4	6
- 1	9
2	7

tens	ones
2	12
3	2
- 1	4
1	8

tens	ones
6	11
7	1
- 5	5
1	6

tens	ones
3	10
9	0
- 2	8
6	2

tens	ones
4	13
5	3
- 3	7
1	6

tens	ones
3	12
4	2
- 1	6
2	6

tens	ones
7	15
8	5
- 4	8
3	7

tens	ones
5	14
6	4
- 2	9
3	5

Reinforcement

Give each student a place value chart on a worksheet. In turn, the students roll two dice and make two-digit numbers. A subtraction is made using the larger number as the starting set. The others record the subtraction on their charts and find the difference. Then one student does the subtraction on the chalkboard.



tens	ones
6	4
-4	6



tens	ones
5	1
-1	5

Enrichment

Have the students write imaginary word problems that deal with addition or subtraction of two-digit numbers. The examples should then be illustrated and displayed.

I found 99 ghosts in my closet.
Sixty-six of them wore glasses.
How many were not wearing glasses?



UNIT 10 LESSON 9

Objective A46

Subtract 2 two-digit numbers, with and without regrouping.

Vocabulary

Trade a ten, starting set

Materials

Crayons

Introducing the Lesson

Complete the following chart together.

Number of students in class:	
wearing sneakers	
with brown hair	
with blue eyes	
wearing red	
wearing green	

After the chart is complete, subtract, e.g., the number of students wearing sneakers from the total number to find how many are *not* wearing sneakers. Count students to check. Repeat with all categories.

Use imaginary numbers in the chart so that sufficient practice is given for both regrouping and nonregrouping situations.

Teaching the Lesson

Show the students how to record subtraction without using a place value chart to align tens and ones.

Do several two-digit subtraction examples with the students. Emphasize the question, "Do you need to trade a ten for more ones?" Use chalkboard examples in which trading is and is not required. Provide materials to model some examples. Take particular care with examples having zero in the ones place.

$$\begin{array}{r} 50 \\ -37 \\ \hline \end{array}$$

Name _____



42 cows in all.
28 are in the barn.
How many are out.

tens	ones
3	12
~~4~~	~~2~~
2	8
1	4

14 cows are outside.

Subtract. You may need to trade.

1 14 ~~24~~ − 16 8	2 13 ~~33~~ − 17 16	4 12 ~~52~~ − 24 28	5 11 ~~61~~ − 47 14	3 13 ~~43~~ − 26 17
7 11 ~~81~~ − 44 37	78 − 35 43	3 15 ~~45~~ − 29 16	4 10 ~~50~~ − 32 18	5 12 ~~62~~ − 25 37



41 − 24 17	32 − 12 20	60 − 27 33	53 − 16 37
23 − 17 6	43 − 29 14	68 − 42 26	33 − 14 19

Two-place subtraction two hundred nine 209

Using the Pages

- Do the example at the top of page 209 together. Emphasize that not all examples will require a trade. Provide materials for those students who need them. In particular, watch for the following kind of error.

$$\begin{array}{r} 63 \\ -28 \\ \hline 45 \end{array}$$

Students making this error should use place value materials until they are clear on the starting set and what is being removed.

- The colouring activity on page 210 is meant as an exploration of the trading process. It does not matter which squares are coloured as long as the correct number is coloured in each case. First, the students colour squares as directed, count and record the uncoloured squares, and then subtract to check.

Colour and count.

Subtract to check.

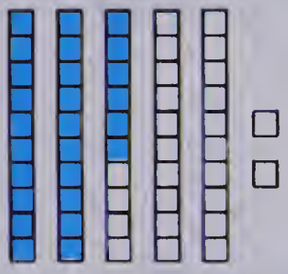
Start with 35.
Colour 28 red.
How many are not red?



tens	ones
~~2~~	~~15~~
~~3~~	~~5~~
− 2	8
	7

7 are not red.

Start with 52.
Colour 26 blue.
How many are not blue?



tens	ones
~~4~~	~~12~~
~~5~~	~~2~~
− 2	6
2	6

26 are not blue.

Start with 41.
Colour 18 green.
How many are not green?



tens	ones
3	11
~~4~~	~~1~~
− 1	8
2	3

23 are not green.

Start with 24.
Colour 17 yellow.
How many are not yellow?



tens	ones
1	14
~~2~~	~~4~~
− 1	7
	7

7 are not yellow.

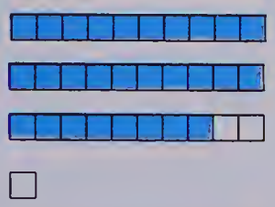
Extra Practice

Worksheet A46
Pages 209-210

Colour and count.

Subtract to check.

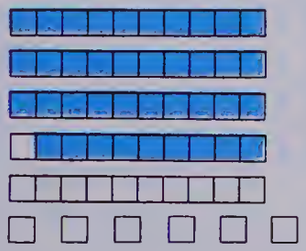
Start with **31**.
Colour **28** red.
How many are not red?



tens	ones
2	11
~~3~~	~~1~~
− 2	8
	3

3 are not red.

Start with **56**.
Colour **39** green.
How many are not green?



tens	ones
~~4~~	~~16~~
~~5~~	~~6~~
− 3	9
1	7

17 are not green.

Reinforcement

Provide the following chalkboard or worksheet exercises.

a.	37	**b.**	58	**c.**	76
	−22		−23		−29
d.	32	**e.**	43	**f.**	60
	−18		−25		−33
g.	45	**h.**	37	**i.**	29
	−27		−14		− 7
j.	52	**k.**	80	**l.**	61
	−49		−65		−16

Enrichment

Ask the students to supply the missing numbers. Have the students check their answers with a calculator.

a.	27	**b.**	46	**c.**	85
	−□		−□		−□
	13		21		32
d.	42	**e.**	54	**f.**	80
	−□		−□		−□
	16		37		25

Problem Solving Activities

Assign Level 2, Unit 10

UNIT 10 LESSON 10

Objective A47

Add or subtract 2 two-digit numbers, with and without regrouping.

Vocabulary

Add, subtract, trade, estimate

Materials

Number line to 100
Crayons

Introducing the Lesson

List 4 one-digit numbers on the chalkboard, e.g., 3, 5, 1, and 8. Ask the students to use them to make 2 two-digit numbers. Then have them add or subtract the two numbers to see who can get an answer that is closest to 50. Check solutions together. Repeat.

35	85	$\overset{7}{8}\ \overset{11}{1}$	58
+18	−31	−3 5	−13
53	54	4 6	45

Teaching the Lesson

Review two-digit addition with and without trading. Emphasize adding the ones first and trading 10 ones for a ten.

Review two-digit subtraction with and without trading. Stress deciding whether it is necessary to make a trade, the recording of the trade, and the subtracting of the ones first.

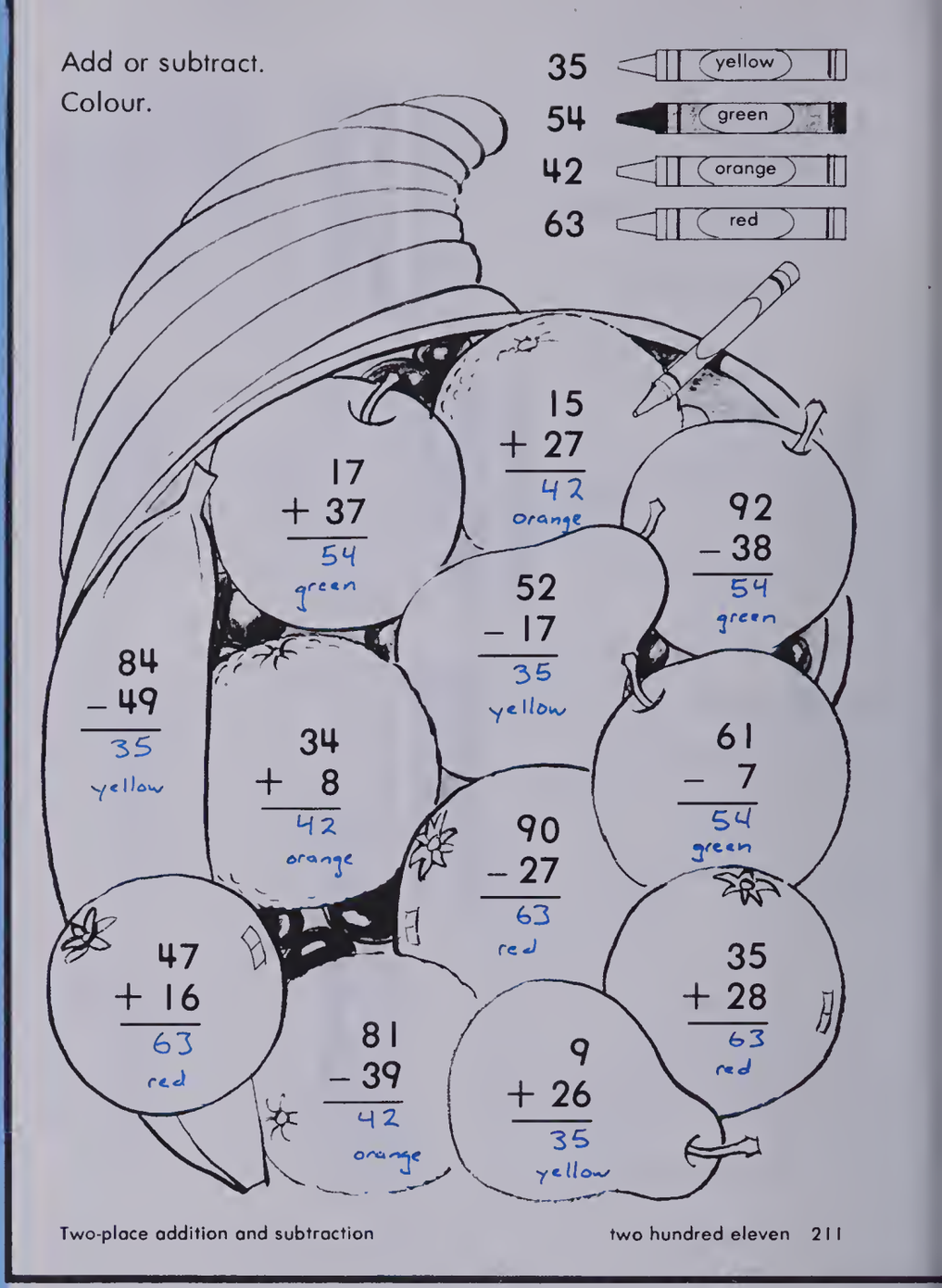
Do several addition and subtraction examples in which the students first *estimate* an answer. Use a number line to illustrate how to estimate.

Reinforcement

1. Provide sets of numeral cards labelled 1 to 9. The students individually can play the game described in Introducing the Lesson.

2. Have the students complete the following. Place value materials can be used if needed.

a. 4 tens 15 ones = 5 tens ___ ones
b. 7 tens 11 ones = 8 tens ___ ones
c. 0 tens 14 ones = ___ tens 4 ones
d. 5 tens 12 ones = ___ tens 2 ones



Using the Page

- Provide crayons for page 211. Remind students to watch for the signs, complete the computation, and then colour as directed.

Make a trade to get more tens.

4 tens 12 ones

5 tens 2 ones

tens	ones
3	16
4	6

tens	ones
2	11
3	1

Add.

34 + 7 = 41	9 + 26 = 35	58 + 24 = 82	47 + 16 = 63	60 + 28 = 88

Make a trade to get more ones.

6 tens 3 ones



5 tens 13 ones

tens	ones
4	12
~~5~~	~~2~~

tens	ones
2	10
~~3~~	~~0~~

Subtract.

43 − 7 = 36	21 − 8 = 13	50 − 24 = 26	63 − 49 = 14	85 − 42 = 43

Add or subtract.

36 + 24 = 60	51 − 6 = 45	28 + 47 = 75	80 − 45 = 35	7 + 64 = 71

Extra Practice

Worksheet A47
Page 211

Add or subtract.
What is the secret message?

87	18	42	85	61	18	46	26	91	25	75	61	13	29	99	45	53	27
− 46	+ 7	− 17	− 53	− 9	+ 14	− 38	+ 32	− 66	+ 25	− 23	− 29	+ 12	+ 16	− 66	+ 52	− 8	+ 14
41	25	25	32	52	32	8	58	25	50	52	32	25	45	33	97	45	41
K	E	E	P	U	P	T	H	E	S	U	P	E	R	W	O	R	K

25	58	41	97	32	45	50	8	52	33
E	H	K	O	P	R	S	T	U	W

UNIT 10 TEST

Part 1: Add two-digit numbers, with and without regrouping.

Part 2: Subtract two-digit numbers, with and without regrouping.

Part 3: Add or subtract two-digit numbers.

UNIT 11
Fractions, Decimals, and Measurement

Theme: Baby Animals

Lesson		Objective	Pages
1	N24	Identify the fractions $\frac{1}{2}$ and $\frac{1}{4}$.	213-214
2	N25	Identify and print $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.	215-216
3	N26	Identify and print tenths from $\frac{1}{10}$ to $\frac{9}{10}$.	217-218
4	N27	Identify and print tenths from 0.1 to 0.9.	219-220
5	M14	Find the minutes after and minutes to the hour.	221-222
6	M15	Count and make change for 25¢.	223-224
7	M16	Experience mass and non-standard units using a pan balance.	225-226
8	M17	Estimate and measure mass in kilograms.	227-228
9	M18	Experiment with capacity using litre and half litre containers.	229-230
10	M19	Identify the use of common measurement tools.	231-232
Test		Decimals and measurement	

Vocabulary

whole
part
equal parts
fraction
one half
one third
one fourth
tenths
pie
square
rectangle
triangle
mass
lighter
heavier
pan balance
kilogram
scales
estimate/guess
measure

decimal
decimal point
minutes after
minutes to
later
earlier
change
make change
penny
nickel
dime
quarter
litre
half litre
container
ruler
beaker
thermometer
temperature
degrees Celsius

Printed Directions:

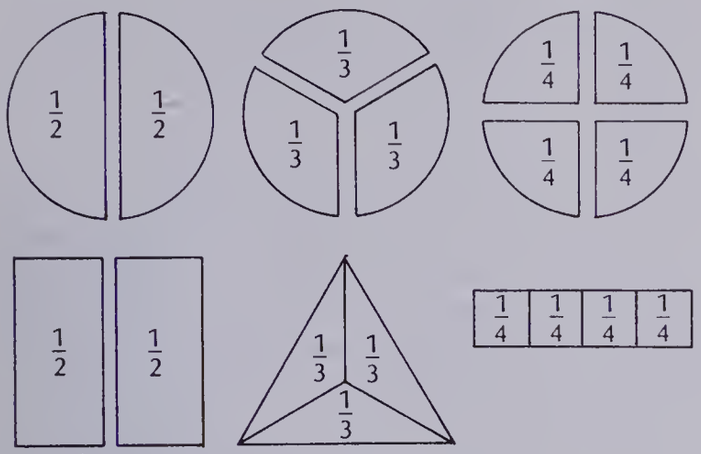
Mark the answer.
Colour one part.
Print the fraction.
How many tenths are coloured?

Which shows $\frac{3}{10}$?

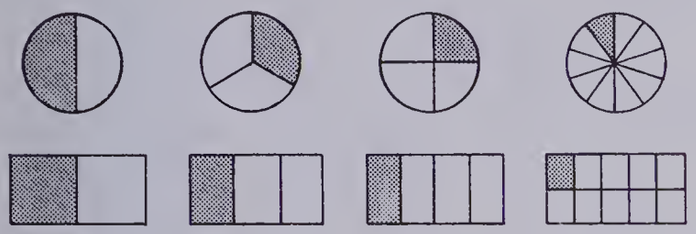
Print the decimal.
Colour the decimal amount.
30 minutes earlier/later
Count the money.
Check your change.
Which has the greater mass?
A __ has the same mass as __.
Print more or less.
Guess the mass.
Then use the scales.
How much does it hold?
Which holds more?
How long? How heavy? What time?
How hot? How much water?

Materials

Fraction pieces: (on pies, squares, triangles, and rods)



Unit fraction pictures:



Various tags:

Vocabulary: one half; one fourth; one third; one tenth

Fraction: $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{10}$ $\frac{2}{10}$ $\frac{3}{10}$... $\frac{9}{10}$

Decimal: 0.1 0.2 0.3 ... 0.9

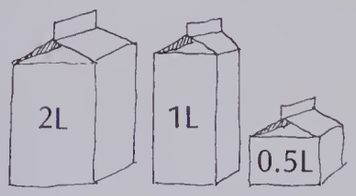
Measurement Tools: pan balance; thermometer; container; ruler; clock

Unit: one kilogram; one litre; 1°C; one centimetre; one litre

Questions: How long?; How heavy?; What time?; How hot?; How much water?

Pan balances (4 to 6)
Kilogram scales (4 to 6)
Crayons bundled into sets of 10:
Set of clock faces
Two demonstration clocks

Collection of dairy product cartons:



pencils
scissors
crayons
unifix cubes
coins
price tags

About This Unit

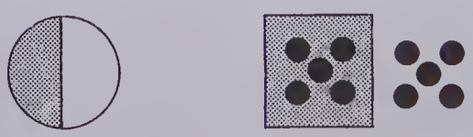
Unit 11 introduces the students to concepts involving fractions, decimals, mass, and capacity and it also extends understanding and skill with time, money, estimation, and measurement tools. It is not expected that all objectives of this unit will be mastered; rather, the students should experience, explore, and discuss the associated ideas in a rich environment designed to facilitate the cognitive development of each child. It is assumed throughout that the students will encounter activities involving concrete materials and oral language before practice with mathematical symbols.

Pattern of Developmental Experiences

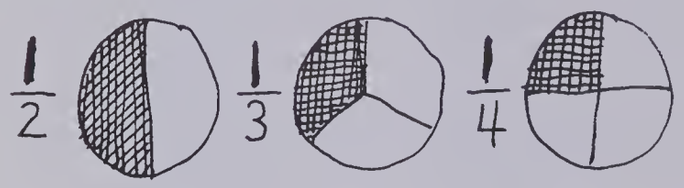


It is well known that elementary students develop concepts involving fractions in a slow, discontinuous manner. Understandings that appear one week are apt to disappear the following week. Classroom experience and research results suggest that a manipulative approach that focuses on key concepts and skills can be successful. The distinguishing characteristics of *Houghton Mifflin Mathematics,* Grade 2, are as follows:

1. The fractional models and exercises in Unit 11 involve various *regions*—symbolic work with sets is begun in Grade 3. This approach is consistent with our present knowledge of the cognitive development of students. Appropriate activities involving the fractions and sets are discussed in Lessons 3 and 4.

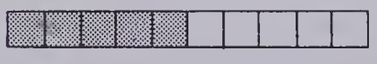


2. The instructional objectives are restricted to halves, thirds, fourths, and tenths. For halves, thirds, and fourths only, the *unit fractions* are introduced: $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$. This is an appropriate cognitive demand for students in Grade 2. It allows for attention to be focused on one variable; namely, the number of equal parts of a whole. As a result, the key notion of *equal parts of a whole* is treated in greater depth with more varied figures. Students should have an opportunity to draw and construct situations involving $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$; the identification and *construction* of fractions are both necessary at this level.



3. In one sense, the inclusion of tenths in Lessons 3 and 4 is an acknowledgement of the increased importance of the decimal system in our world and in the mathematics program. It also permits the introduction of fractions other than unit fractions in a way that still allows students to focus attention on only one variable, in this case, the number of specified (coloured) parts. Using the sequence found in Lessons 1 to 3, it becomes easier to introduce new fractions such as $\frac{2}{4}$, $\frac{3}{4}$, and $\frac{2}{3}$, assuming this extension is either desired by the teacher or required by curriculum directives.

$\frac{3}{10}$ or 0.3 

$\frac{5}{10}$ or 0.5 

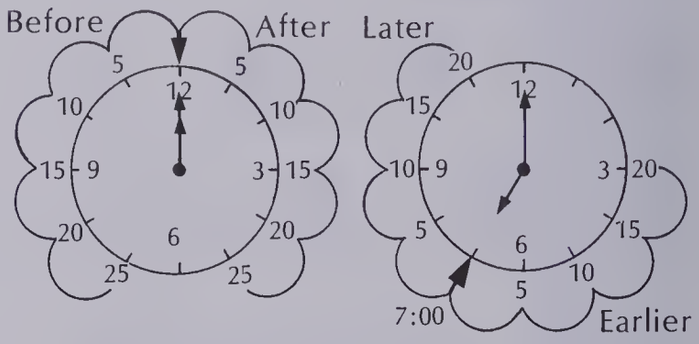
4. A fundamental misconception may develop in regard to the interpretation of fractions. Students need to understand and to be skillful with the counting strategies, but they must distinguish fractional models and concepts from simpler whole number models and concepts. Stress should be placed on the relationships of the *whole*, the *equal parts in all*, and the *specified (coloured) parts*. Lesson 4, on decimal fractions, requires understanding of these fundamental concepts. Probing interviews and group questioning is recommended.

"Does this picture show 4, $\frac{4}{10}$, or 0.4?"

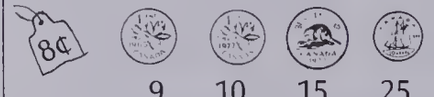
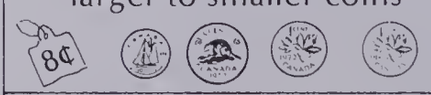


It depends on what the whole number is. If each disc is a whole, 4 are coloured, so the picture shows 4. If the pile is a whole, $\frac{4}{10}$ of the pile is coloured, so $\frac{4}{10}$ or 0.4 is shown.

Various counting strategies arise in Lessons 5, 6, 7, and 8. Lesson 5 involves telling time using the phrases *minutes to* and *minutes after* and also involves finding times earlier and later than a specified time. Both tasks require skill with counting by 5s and an understanding of how this relates to a clock face and telling time.



Lesson 6 involves counting and making change. This requires skill with *counting on by 1s, 5s, and 10s* and an understanding of how this relates to coins and to the specific instances of making change. Students may be shown several methods for counting up from a purchase price to the money paid. Unfortunately, no method for Grade 2 students is consistently the best.

Three Methods for Counting and Making Change	Comments
1. counting on: smaller to larger coins 	artificial for this example
2. counting on: larger to smaller coins 	difficult computation
3. counting on: a combination 	most meaningful, requires flexibility

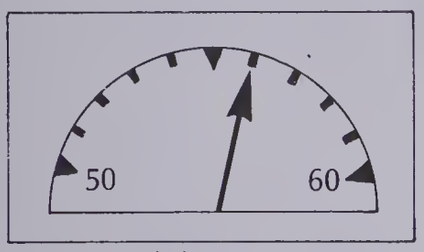
For this reason, a *guess and test* strategy will be used by many students. Try not to discourage this seemingly primitive approach. The guess and test method is a versatile problem-solving strategy that is very useful in many situations.

Lessons 7 and 8 involve comparing masses on a pan balance and measuring mass on a kilogram scale. As mentioned above, both lessons incorporate counting skills. In Lesson 7, bundles of 10 crayons and single crayons are utilized as non-standard units of mass. The bundling by 10s allows the students to find the mass of a wide variety of materials and also to simulate the use of mass sets (with which Grade 2 students have trouble) with a simpler, place-value mass set.

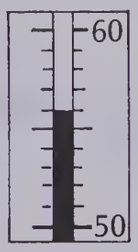


Ten, twenty, thirty, thirty-one, thirty-two crayons

In Lesson 8, students use kilogram scales. Typically, the dials of such scales require counting on by 5s and/or 1s. This skill relates to finding the temperature on a thermometer.



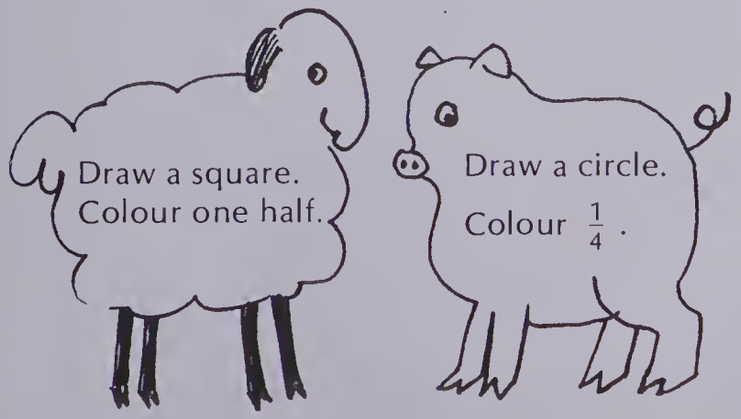
56 kilograms

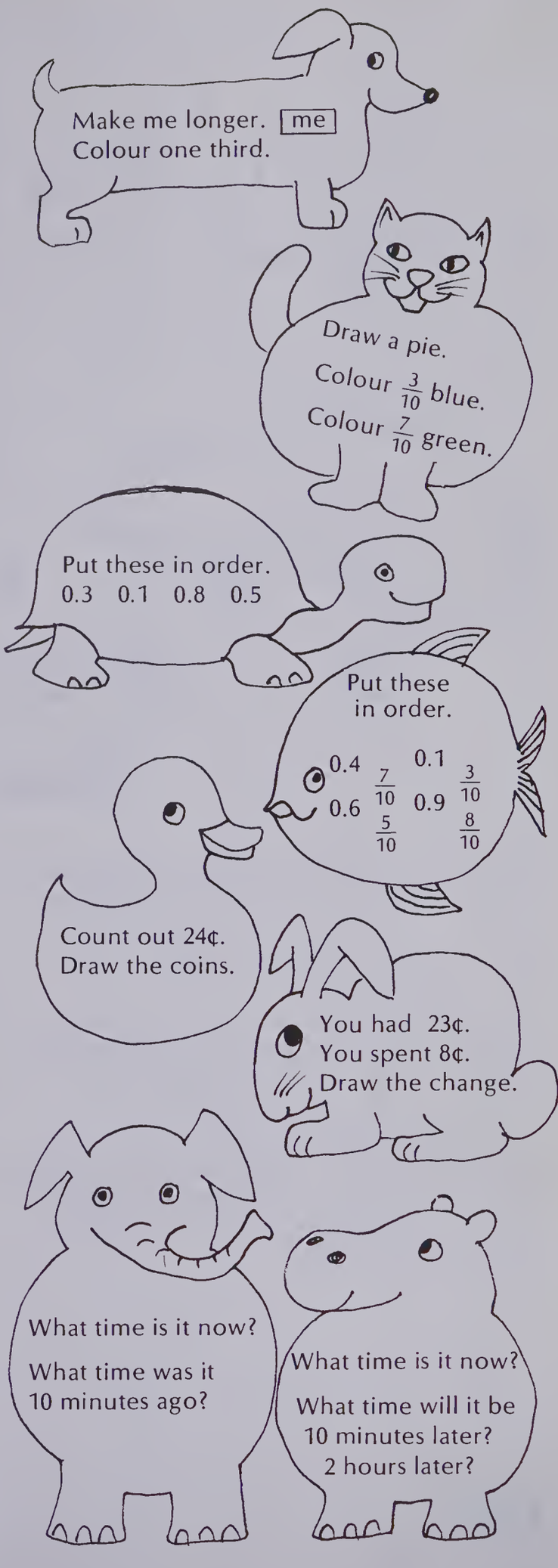


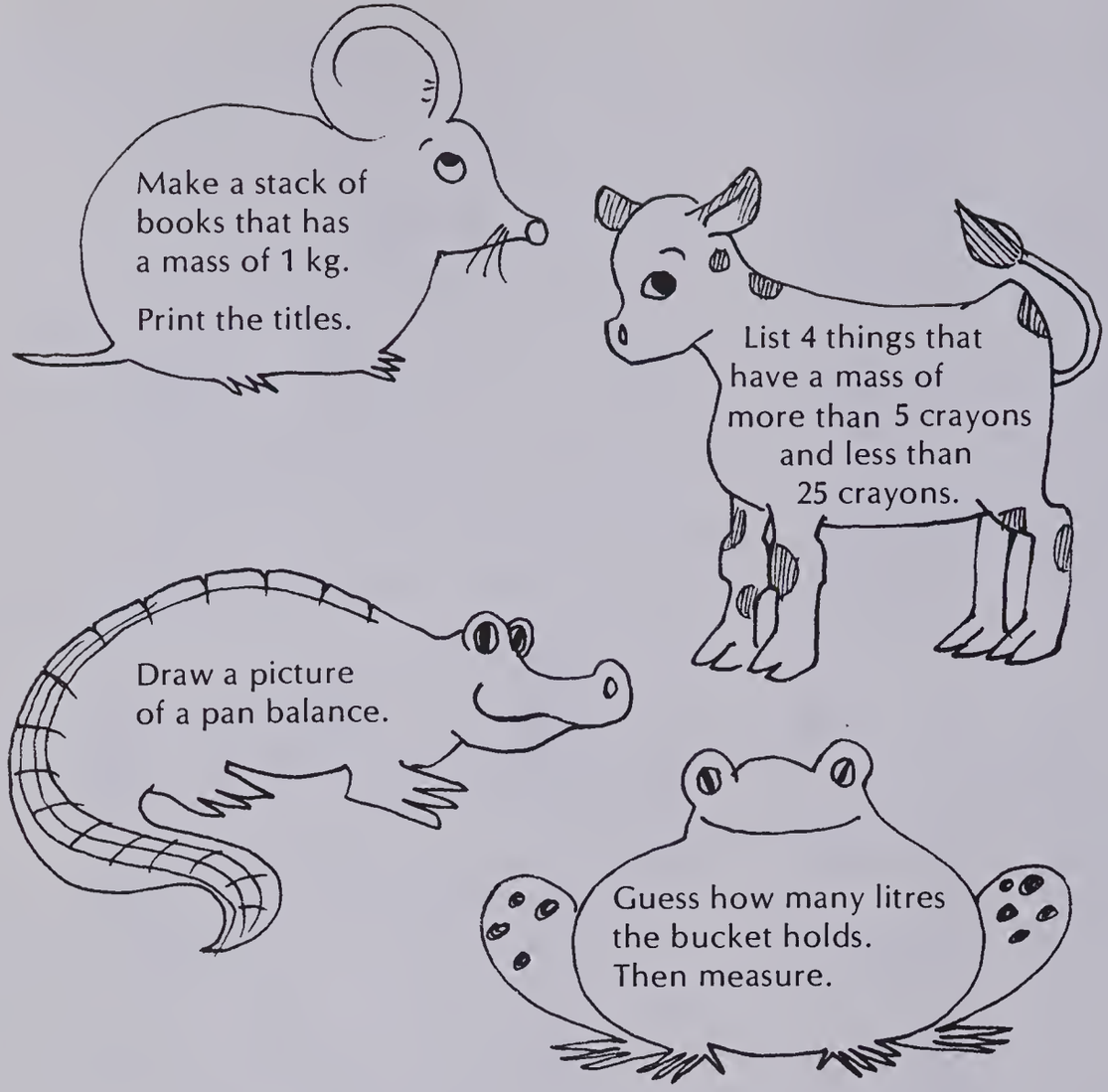
56°C

Ideas

1. Task cards are more motivating for students when they appear on interesting figures. Transfer some of your independent activities that don't seem to work to a more appealing format and watch the difference! Figures that may be used with the unit's theme, *Baby Animals,* are shown on this page. The tasks used illustrate just some of the possibilities.





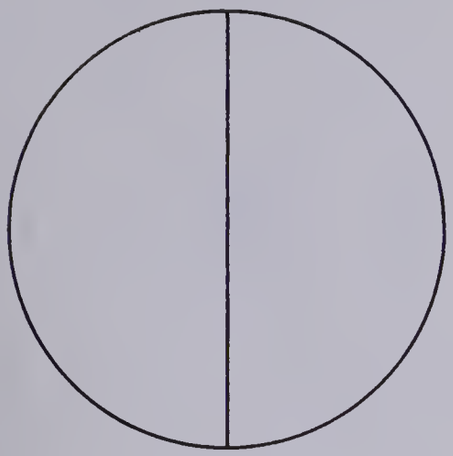
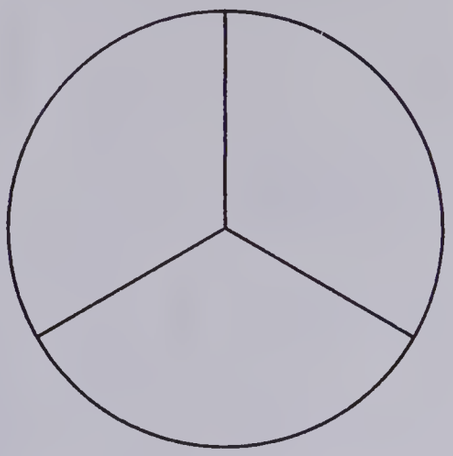
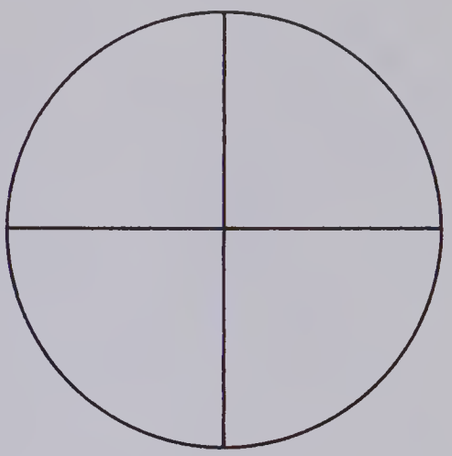


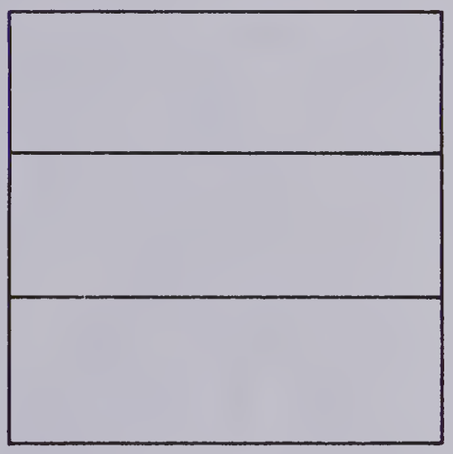
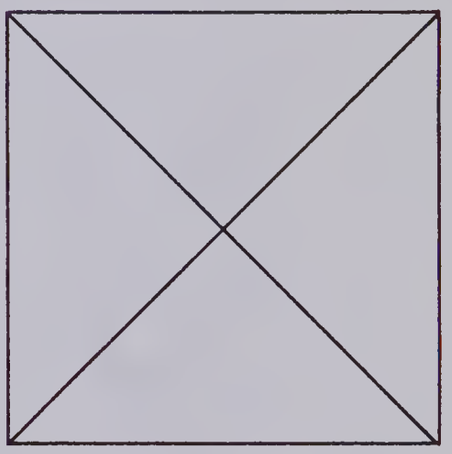
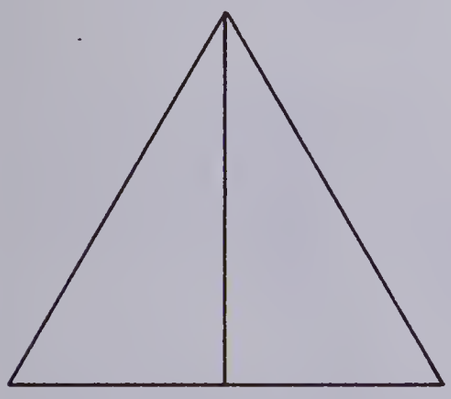
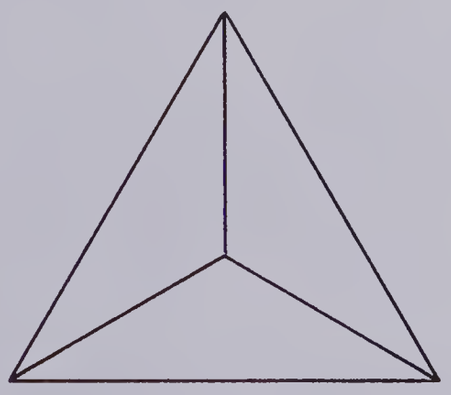
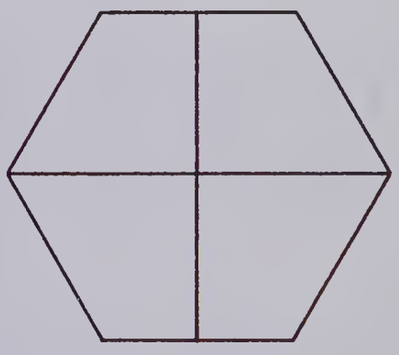
2. Your library will have books on animals and it may even have some devoted to baby animals. Set up a science/reading centre. Allow students to report orally on what they learn about baby animals.

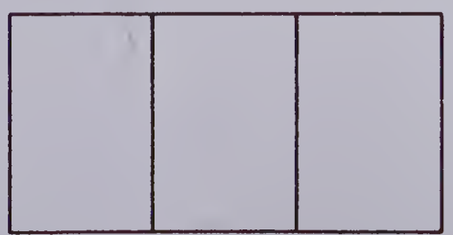
Encourage students to share personal experiences with and descriptions of baby animals such as puppies, kittens, gerbils, goldfish, ducklings, calves, piglets, and so on.

Construct a matching activity using a set of baby animal picture cards and a set of vocabulary cards. Also encourage students to sort the cards into categories and to report orally on their work to the class.

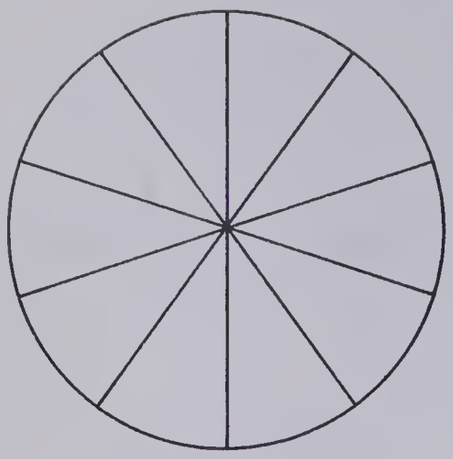
Halves, Thirds, and Fourths

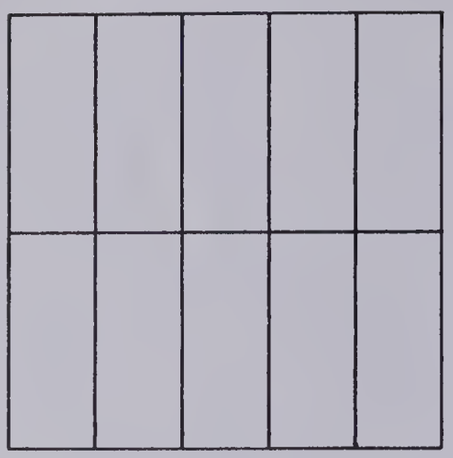




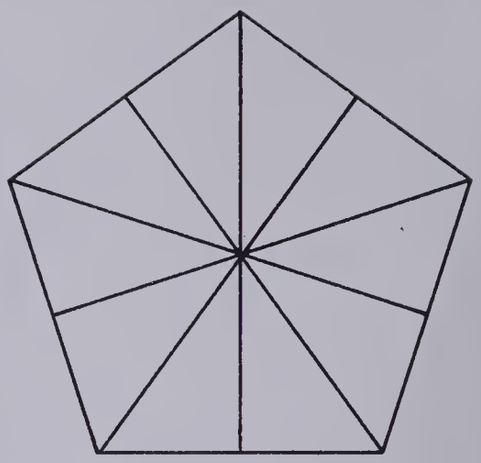






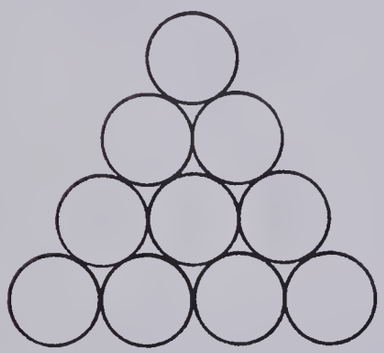


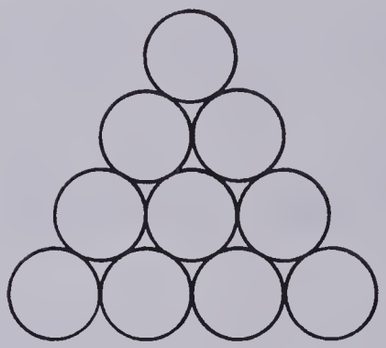

Tenths

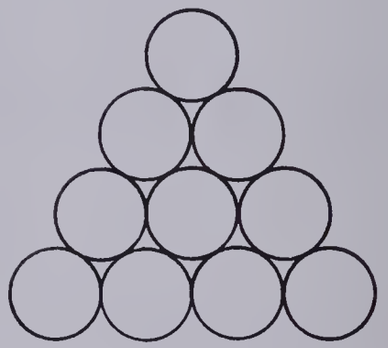






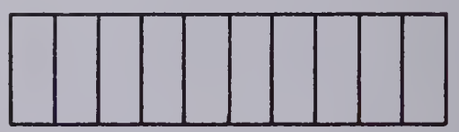


















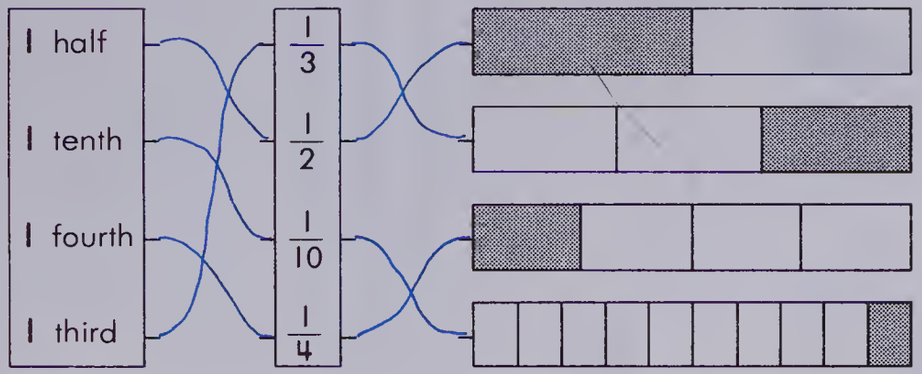






Pretest **Unit 11**

Match.



Print the decimal.

2 tenths 0.2



0.3



10 minutes after 9

Count the money.



10 11 12

12 ¢

Print more or less.



less than a kilogram



less than a litre

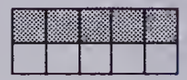
Post-test **Unit 11**

Match.



Print the decimal.

1 tenth 0.1



0.5



20 minutes after 6

Count the money.



10 20 25

25 ¢

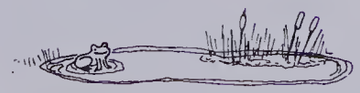
Print more or less.



less than a kilogram



more than a kilogram



more than a litre



less than a litre

UNIT 11 LESSON 1

Objective N24

Identify the fractions $\frac{1}{2}$ and $\frac{1}{4}$.

Vocabulary

Whole, part, equal parts, fraction, one half, one fourth, pie, square, triangle
Direction words: Mark the answer.

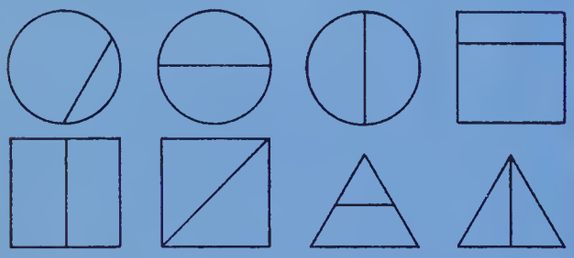
Materials

Unit fraction set: $\frac{1}{2}$, $\frac{2}{2}$, $\frac{1}{3}$, $\frac{3}{3}$, $\frac{1}{4}$, $\frac{4}{4}$ illustrated on disc-, triangle-, and square-shaped cards
Scissors
Crayons
Vocabulary cards: one half, one fourth, $\frac{1}{2}$, $\frac{1}{4}$, and neither

Introducing the Lesson

Show a disc and say, "This is a pie. It is shaped like a circle." Similarly, display a square and a triangle. Display the unit fraction cards and discuss whether a *whole* figure or only one *part* of a figure is coloured.

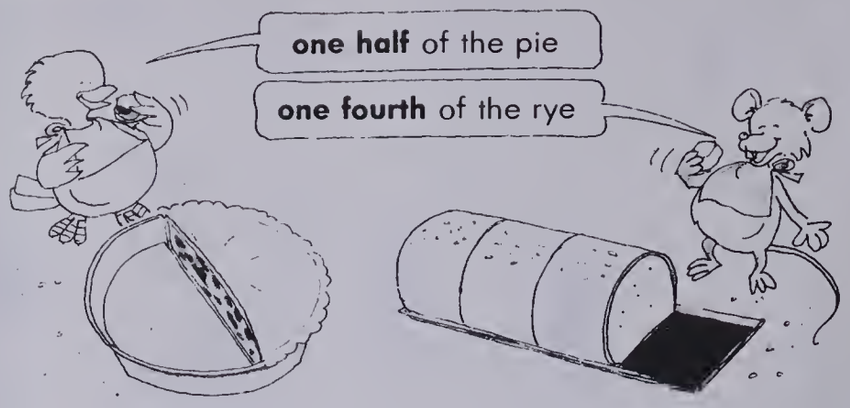
Draw the figures below on chart paper. Have the students identify which figures are cut into equal parts. To check some of the answers, cut out the parts and determine if they match.



Teaching the Lesson

Display a figure that is one-half coloured. Ask, "How many equal parts are there?" and "How many parts are coloured?" Establish when one of two equal parts is coloured that one half or $\frac{1}{2}$ of the whole is coloured. Proceed with a similar discussion for one fourth or $\frac{1}{4}$. Relate the one fourth and $\frac{1}{4}$ to the four equal parts.

UNIT 11 Name _____



Mark the answer. ✓



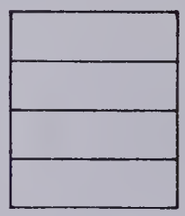
- O one half
- ✓ one fourth
- O neither



- O one half
- O one fourth
- ✓ neither



- ✓ one half
- O one fourth
- O neither



- O one half
- ✓ one fourth
- O neither



- O one half
- O one fourth
- ✓ neither



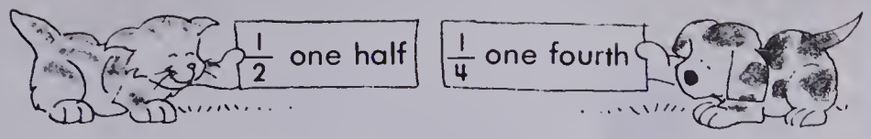
- ✓ one half
- O one fourth
- O neither

Halves and fourths

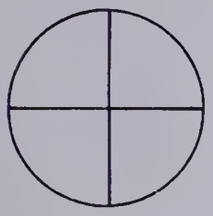
two hundred thirteen 213

Using the Pages

- Choose the vocabulary cards: one half, one fourth, $\frac{1}{2}$, $\frac{1}{4}$, and neither. Show a figure from the unit fraction card set. Have the students find the correct fraction descriptions from the vocabulary cards (including fractions other than $\frac{1}{2}$ and $\frac{1}{4}$). Repeat this activity until all students are successful.
- Have the students print $\frac{1}{2}$ and $\frac{1}{4}$ before beginning pages 213 and 214.



Circle the answer.



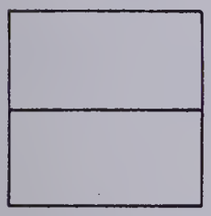
$\frac{1}{2}$ $\frac{1}{4}$

neither



$\frac{1}{2}$ $\frac{1}{4}$

neither



$\frac{1}{2}$ $\frac{1}{4}$

neither



$\frac{1}{2}$ $\frac{1}{4}$

neither



$\frac{1}{2}$ $\frac{1}{4}$

neither



$\frac{1}{2}$ $\frac{1}{4}$

neither



$\frac{1}{2}$ $\frac{1}{4}$

neither



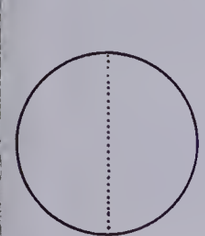
$\frac{1}{2}$ $\frac{1}{4}$

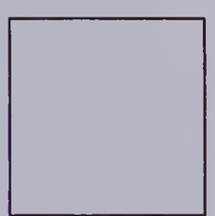
neither

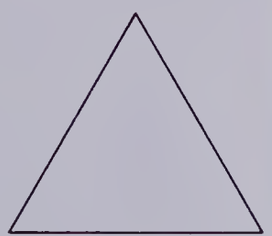
$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$

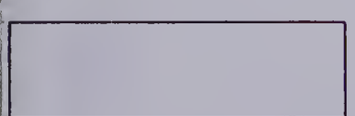
Extra Practice **Worksheet N24**
Pages 213-214

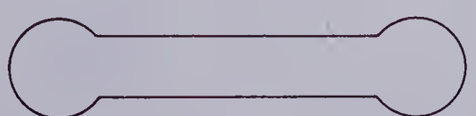
Colour one half.











Reinforcement

Reinforce the meaning of one half and one fourth by discussing the sharing of classroom snacks. Ask a student to cut an apple or orange into 2 equal pieces. In your discussion use the phrases *whole apple* and *one half* of an apple. Next cut a bran muffin into 4 equal pieces. Be sure to use the phrases *whole muffin* and *one fourth* of a muffin. Consider some of the following questions.

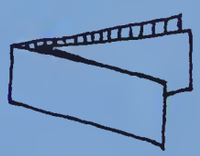
a. Would you rather have one half or one fourth of an apple?

b. Which would be smaller, one half or one fourth of a muffin?

Enrichment

Have the students fold paper strips into two equal parts and label each part $\frac{1}{2}$. Demonstrate two ways of folding a paper strip into four equal parts.

a. Fold the strip in half and then in half again. (Note that $\frac{1}{2}$ of $\frac{1}{2}$ is $\frac{1}{4}$.)



b. Loop the strip twice, bringing the ends together. Label each part $\frac{1}{4}$.



UNIT 11 LESSON 2

Objective N25

Identify and print $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$.

Vocabulary

One third, equal parts in all
Direction words: Colour one part.
Print the fraction.

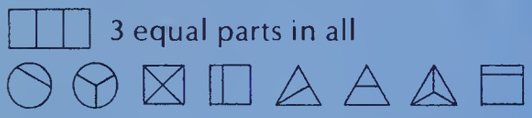
Materials

Unit fraction set: $\frac{1}{2}$, $\frac{2}{2}$, $\frac{1}{3}$, $\frac{3}{3}$, $\frac{1}{4}$, $\frac{4}{4}$

Scissors, crayons, vocabulary cards

Introducing the Lesson

Draw the figures below on chart paper. Have the students discover which figures are cut into equal parts. Record each answer as shown. You may need to cut out some of the parts to determine whether they match.



3 equal parts in all

Teaching the Lesson

Display a square that is one-third coloured. Ask, "How many equal parts in all?" and "How many parts are coloured?" Record the answer as shown. Circle the fraction $\frac{1}{3}$ and say, "One third of the *whole* square is coloured."



$\frac{1}{3}$ coloured parts
parts in all

Repeat this procedure for a variety of figures and unit fractions ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$).

For students to distinguish between fractions and whole numbers, it is often necessary for them to see the two concepts together. Situations similar to the following should be discussed.
"How much is coloured?"



3 whole squares
$\frac{1}{3}$ of a whole square



2 whole triangles
$\frac{1}{2}$ of a whole triangle

Name _____



$\frac{1}{3}$ part coloured
3 parts in all

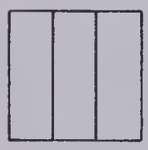




$\frac{1}{4}$ coloured in all



$\frac{1}{2}$ coloured in all



$\frac{1}{3}$ coloured in all



$\frac{1}{4}$ coloured in all



$\frac{1}{2}$ coloured in all



$\frac{1}{3}$ coloured in all



$\frac{1}{3}$



$\frac{1}{4}$



$\frac{1}{4}$



$\frac{1}{2}$



$\frac{1}{3}$



$\frac{1}{2}$

One third

two hundred fifteen 215

Using the Pages

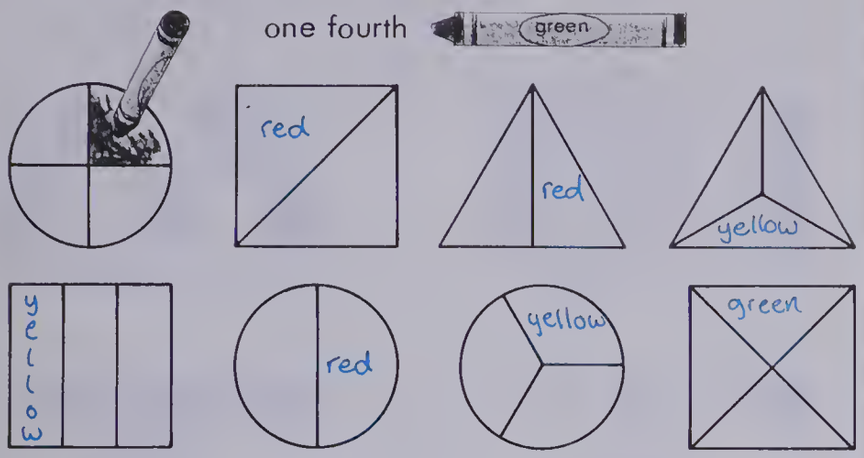
- Show a figure from the unit fraction set. Have the students print and say the correct fraction. For each fraction have them recall what the numbers represent, e.g., *one part is coloured, three equal parts in all.*
- Page 215 requires the students to name the unit fraction illustrated.
- Students will need crayons as they colour illustrations of unit fractions on page 216.

Colour.

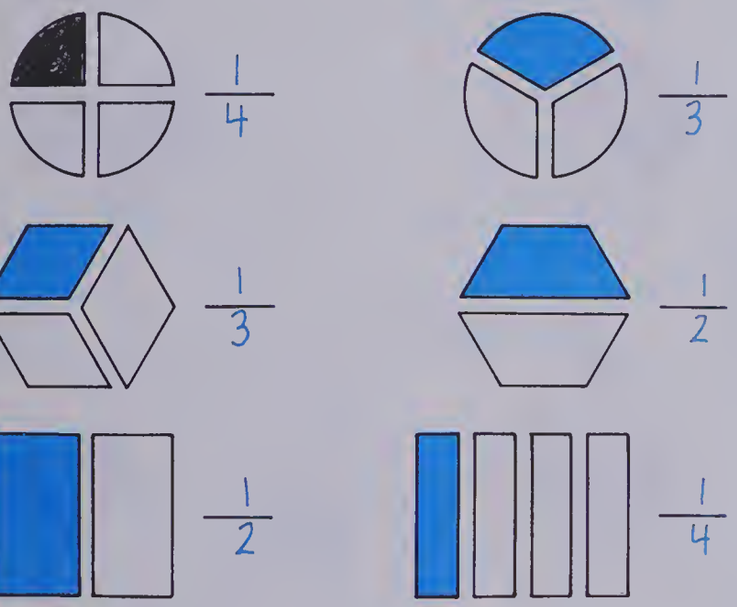
one half — red

one third — yellow

one fourth — green



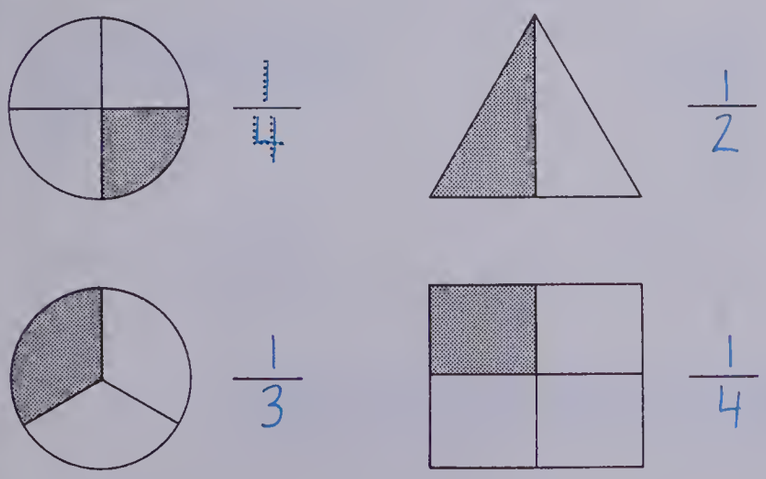
Colour one part. Print the fraction.



Extra Practice

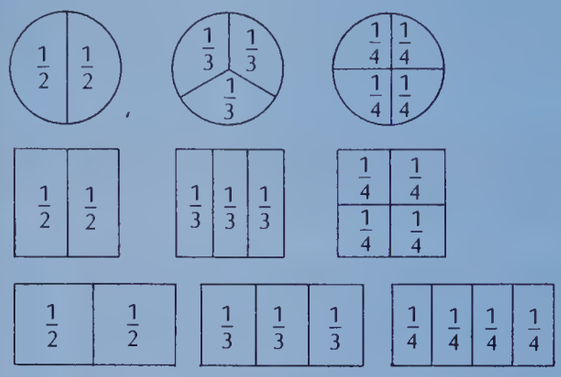
Worksheet N25
Pages 215-216

Print the fraction.



Reinforcement

Construct three sets of fraction materials from sturdy cardboard: discs, squares, and rods. Label one side with the fraction name.



1. With the fraction labels down, have students reassemble the mixed up pieces into *whole* objects.

2. Challenge the students to place the fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ in order by size.

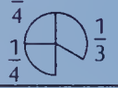
Enrichment

Use the fraction materials suggested above and challenge the students to try to make wholes with different disc combinations. Require everyone to record their findings on three separate sheets for combinations less than a whole, more than a whole, and equal to a whole.

Less than a Whole

$\frac{1}{4}$ and $\frac{1}{3}$ 

$\frac{1}{3}$ and $\frac{1}{2}$ 

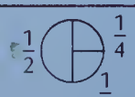
$\frac{1}{4}$ and $\frac{1}{4}$ and $\frac{1}{3}$ 

More than a Whole

$\frac{1}{2}$ and $\frac{1}{3}$ and $\frac{1}{3}$ 

$\frac{1}{2}$ and $\frac{1}{3}$ and $\frac{1}{4}$ 

Equal to a Whole

$\frac{1}{2}$ and $\frac{1}{4}$ and $\frac{1}{4}$ 

$\frac{1}{3}$ and $\frac{1}{3}$ and $\frac{1}{3}$ 

UNIT 11 LESSON 3

Objective N26

Identify and print tenths from $\frac{1}{10}$ to $\frac{9}{10}$.

Vocabulary

One tenth, tenths, fraction
Direction words: How many tenths are coloured? Which shows $\frac{3}{10}$?

Materials

Unifix cubes: 10 blue and 10 red

Introducing the Lesson

Pop together 9 blue cubes and 1 red cube. Ask, "How many cubes are there in all?" *Ten.* "How many are red?" *One.* Challenge the students to write what fraction of the cubes is red. To help them discover the answer, introduce the now familiar aid:

parts that are red 1
equal parts in all 10

$\frac{1}{10}$ of the whole is red.

Use the example of $\frac{1}{3}$ (one third) and $\frac{1}{4}$ (one fourth) to encourage students to suggest that $\frac{1}{10}$ be read as one tenth.

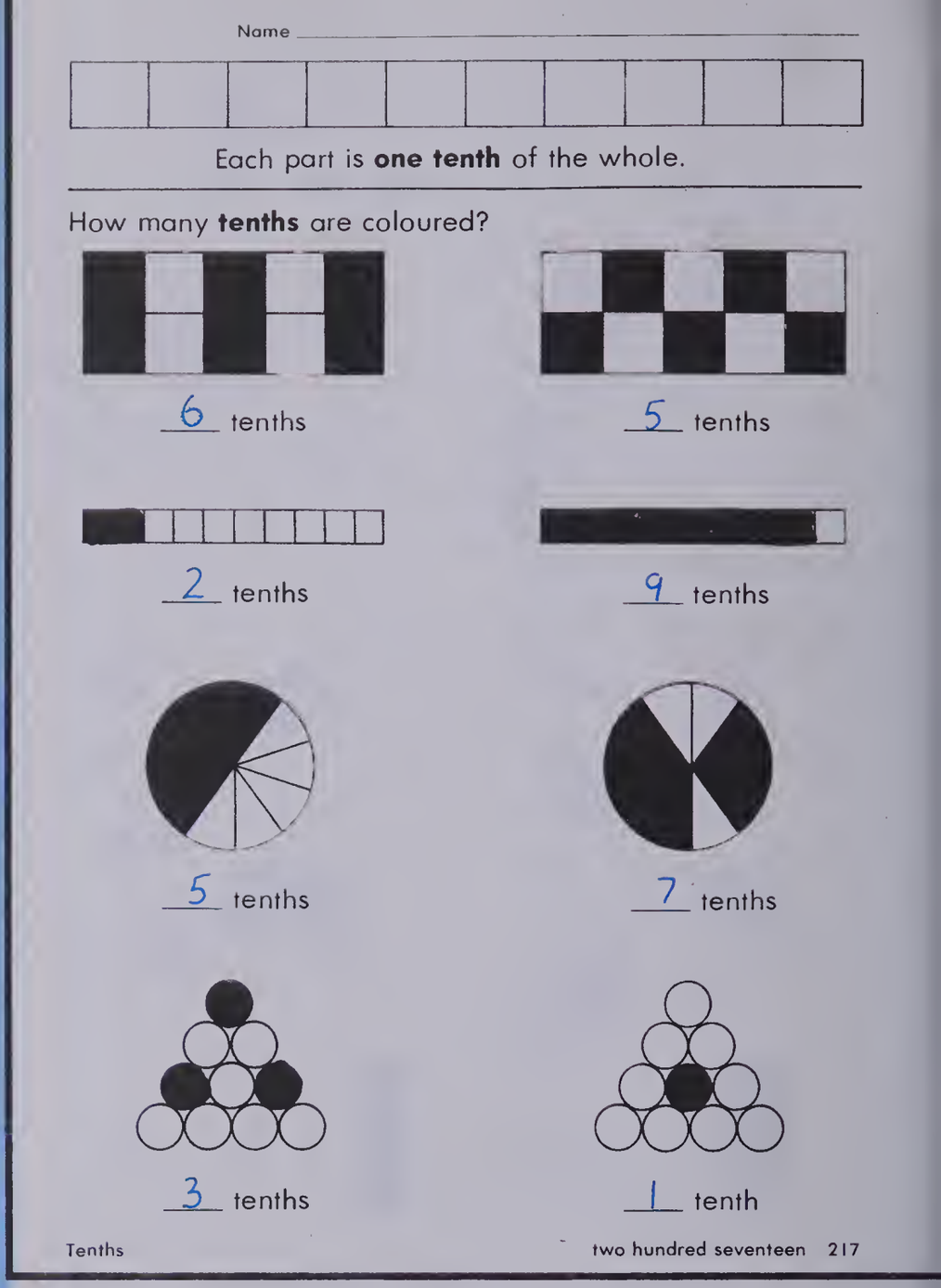
Teaching the Lesson

Repeat the procedure described above using 8 blue cubes and 2 red cubes. Discuss how, if more than one part is red, then the fraction must represent this.

parts that are red 2
equal parts in all 10

Challenge the students to read $\frac{2}{10}$. Remind them that $\frac{1}{10}$ is read as "one tenth".

Repeat this activity for the fractions $\frac{3}{10}$, $\frac{5}{10}$, and $\frac{8}{10}$.


Name _____

Each part is **one tenth** of the whole.

How many **tenths** are coloured?

6 tenths

5 tenths

2 tenths

9 tenths

5 tenths

7 tenths

3 tenths

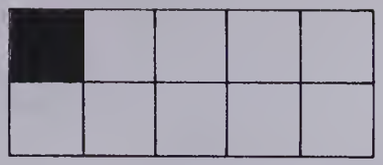
1 tenth

Tenths

two hundred seventeen 217

Using the Pages

- Introduce the figures for showing tenths that are found on pages 217 and 218; namely, rectangles, rods, pies, and "bowling triangles" with chalkboard illustrations. See that the students are comfortable with these figures before they do these two pages.



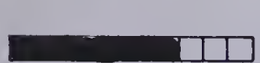
$\frac{1}{10}$ 1 part coloured
10 parts in all



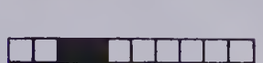
$\frac{5}{10}$



$\frac{4}{10}$



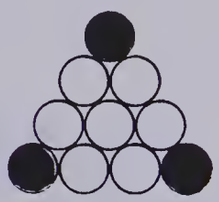
$\frac{7}{10}$



$\frac{2}{10}$



$\frac{6}{10}$



$\frac{3}{10}$

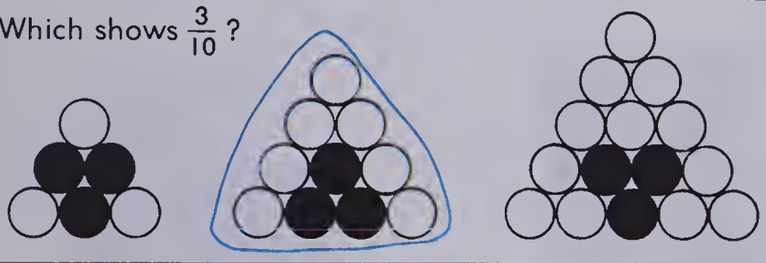
6 tenths $\frac{6}{10}$

9 tenths $\frac{9}{10}$

2 tenths $\frac{2}{10}$

4 tenths $\frac{4}{10}$

Which shows $\frac{3}{10}$?



Extra Practice

Worksheet N26
Pages 217-218

Colour the fraction.

$\frac{6}{10}$



$\frac{3}{10}$



one tenth

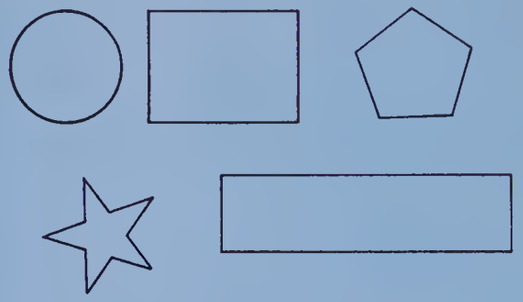


nine tenths



Enrichment

Challenge the students to explore ways to cut these figures into ten equal parts. Discuss the methods that are employed.



UNIT 11 LESSON 4

Objective N27

Identify and print tenths from 0.1 to 0.9.

Vocabulary

Tenths, decimal, decimal point, whole
Direction words: Print the decimal. Colour the decimal amount.

Materials

Unifix cubes: 10 blue and 10 red

Introducing the Lesson

Alert the students to watch for a pattern with tenths. Exaggerating the decimal point, print $\frac{1}{10} = 0.1$ on the chalkboard and say, "One tenth equals one tenth." Challenge the students to help you continue the written and oral pattern up to $\frac{9}{10} = 0.9$.

$\frac{1}{10} = 0.1$, $\frac{2}{10} = 0.2$, $\frac{3}{10} = 0.3$, . . .

Teaching the Lesson

Explain that both $\frac{1}{10}$ and 0.1 are read as "one tenth"; $\frac{1}{10}$ is the fraction way of printing one tenth and 0.1 is the decimal way. Refer to the decimal points in the list on the board.

Pop together 7 red cubes and 3 blue cubes. Ask someone to suggest what decimal part of the whole rod is blue. Print and read the answer: 0.3 of the whole rod is blue.

Repeat this procedure for the decimals 0.5, 0.7, and 0.9.

Name _____

Decimals

0.8 is another way to show 8 tenths.

$\frac{8}{10} = 0.8$



Print the decimal.

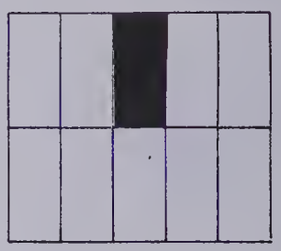
$\frac{7}{10} = 0.7$ $\frac{4}{10} = 0.4$ $\frac{1}{10} = 0.1$

$\frac{9}{10} = 0.9$ $\frac{2}{10} = 0.2$ $\frac{8}{10} = 0.8$

$\frac{3}{10} = 0.3$ $\frac{6}{10} = 0.6$ $\frac{5}{10} = 0.5$



0.4



0.1



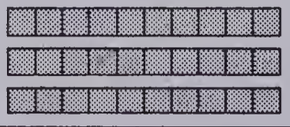
0.9



0.5

Using the Pages

- Point out that the whole figures on pages 219 and 220 are each cut into equal parts.
- For students to distinguish between tenths and whole numbers, it is often necessary for them to use these two concepts together. Situations similar to the following should be discussed.

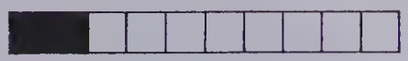


"How much is blue?"
3 whole rods.



"How much is blue?"
0.3 of a whole rod.

Print the decimal.



0.2



0.5



0.3



0.1

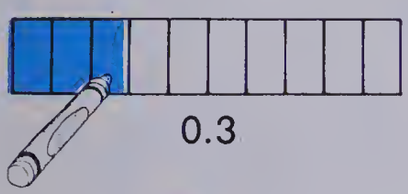


0.9



0.5

Colour the decimal amount.



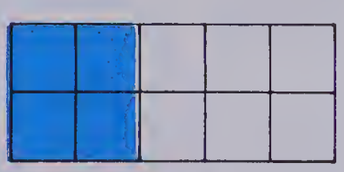
0.3



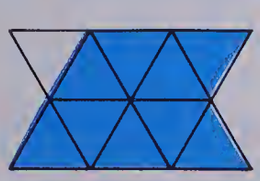
0.7



0.2



0.4



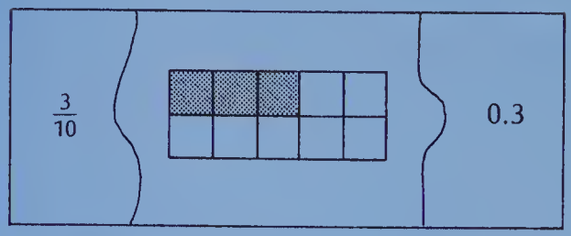
0.9



0.1

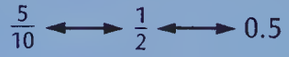
Reinforcement

Ask the students to prepare simple jigsaw puzzles on sturdy cardboard that relate tenths written as fractions and as decimals.



Enrichment

Discuss and demonstrate the following equivalent fractions and decimals using a variety of materials.



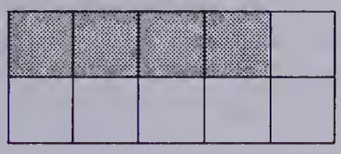


Extra Practice **Worksheet N27**

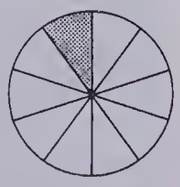
Pages 219-220

Print the decimal.

0.4



0.1



$\frac{6}{10} = 0.6$ $\frac{9}{10} = 0.9$

1 tenth = 0.1 8 tenths = 0.8

UNIT 11 LESSON 5

Objective M14

Find the minutes after and minutes to the hour.

Vocabulary

Minutes after, minutes to, later, earlier
Direction words: 30 minutes earlier. 30 minutes later.

Materials

Two demonstration clocks
Small clock faces

Introducing the Lesson

Review with the students how to count by 5s on a clock face. Practise reading the following times from the demonstration clock face: 6:15, 3:45, 1:25, 10:40, 11:20, and 8:35.

Set a demonstration clock to 5:30. Ask the students to move the minute hand to show 5 minutes later, 10 minutes later, 5 minutes earlier, 10 minutes earlier, 30 minutes later, and 30 minutes earlier.

Teaching the Lesson

Set one demonstration clock to 8:00 and another to 8:10. Ask the students if 8:10 would come before or after 8:00. Determine that 8:10 comes 10 minutes after 8:00. Practise this new way of telling time for 3:15, 7:20, 11:05, and 11:25. Have the students use the demonstration clocks.

Set one clock to 8:00 and the other to 7:50. Ask the students if 7:50 would come before or after 8:00. Determine that 7:50 comes 10 minutes before 8:00. Introduce the phrase "minutes to" as meaning the same as "minutes before". Practise this way of telling time for 3:45, 6:50, 2:40, 5:35, and 9:55.

Draw a line through a clock face. Explain that when the minute hand is between 1 and 29 the phrase "minutes after" can be used, and when it is between 31 and 59 the phrase "minutes to" can be used.

Name _____

What time is it?



8:15

15 minutes after 8



2:25

25 minutes after 2



6:20

20 minutes after 6



3:55

5 minutes to 4



7:45

15 minutes to 8



1:50

10 minutes to 2



4:40

20 minutes to 2



5:35

25 minutes to 6



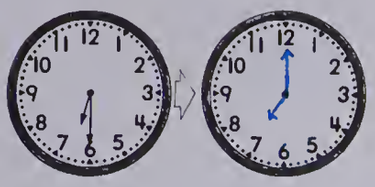
11:45

15 minutes to 12

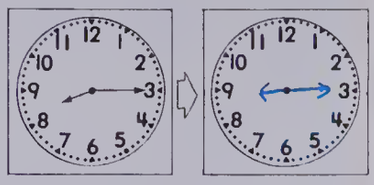
Using the Pages

- Encourage all students to use a clock face as they do page 221. Students may require more practice telling time *to the hour* before page 221 is assigned. A detailed procedure is necessary for some students: "If the minute hand moves to 12, where will the hour hand move? (e.g., 3) What time will it be?" *3:00.* "We know we are looking for some minutes to 3:00. How many minutes to 3:00 is it? Let's count"
- It is recommended that pages 221 and 222 be assigned on separate days.

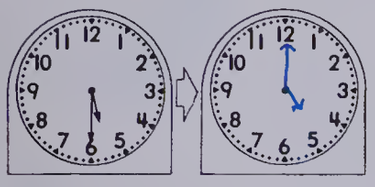
Show the time.



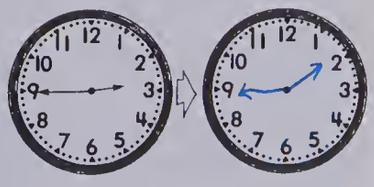
30 minutes later



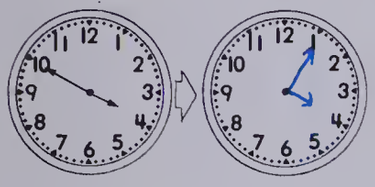
an hour later



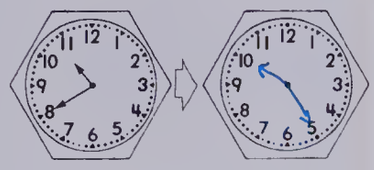
30 minutes earlier



an hour earlier



15 minutes later



15 minutes earlier

Write the time.

6:30	6:15

15 minutes earlier

3:15	3:40

25 minutes later

2:05	1:55

10 minutes earlier

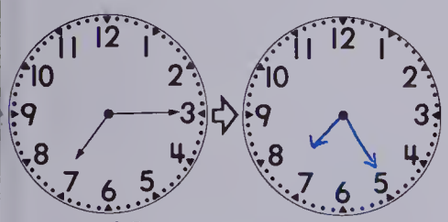
10:30	11:10

40 minutes later

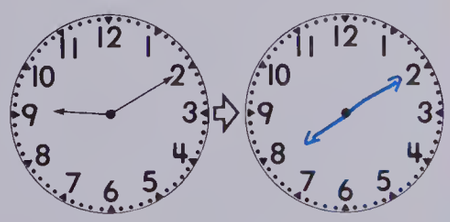
Extra Practice

Worksheet M14
Pages 221-222

Show the time.



10 minutes later



1 hour earlier

7:20	7:10

10 minutes earlier

6:25	7:25

1 hour later

Reinforcement

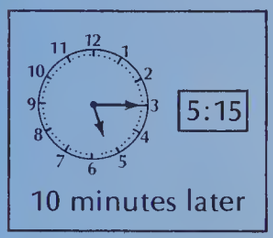
1. Use a clock stamp to prepare a set of Bingo cards. Include the times between 5:00 and 7:00. For the Bingo caller provide corresponding time phrase cards.

15 minutes after 6
10 minutes to 7
6 o'clock

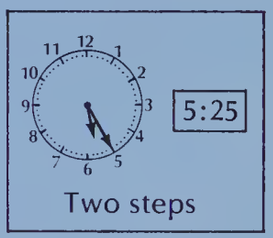
5 thirty or half past 5

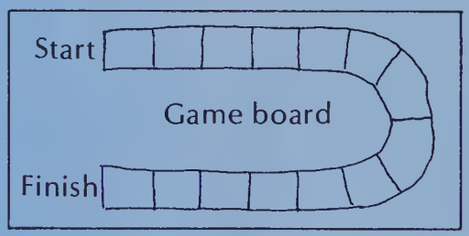
2. Use a clock stamp to prepare a set of cards for a game to practise finding earlier and later times. On the front of each card place a clock and a direction (earlier or later). On the back place the answer and the number of steps forward on a game board.

Front



Back



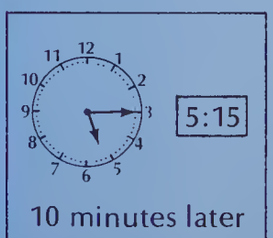


Enrichment

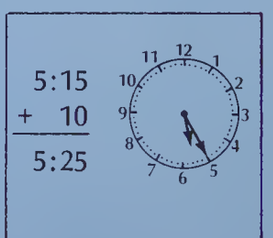
1. Extend the objective of this lesson to include *all* times after and to the hour, not just five minute intervals. Demonstrate how to use counting on by 5s and 1s in order to read these arbitrary times.

2. Show the students how to add and subtract times. Prepare a different set of cards for use with the game described above. (Decide whether to include borrowing and carrying to the hours.)

Front



Back



UNIT 11 LESSON 6

Objective M15

Count and make change to 25¢.

Vocabulary

Change, make change, penny, nickel, dime, quarter, count by 1s, 5s, and 10s
Direction words: Count the money. Check your change.

Materials

Pennies, nickels, dimes, quarters
Price tags

Introducing the Lesson

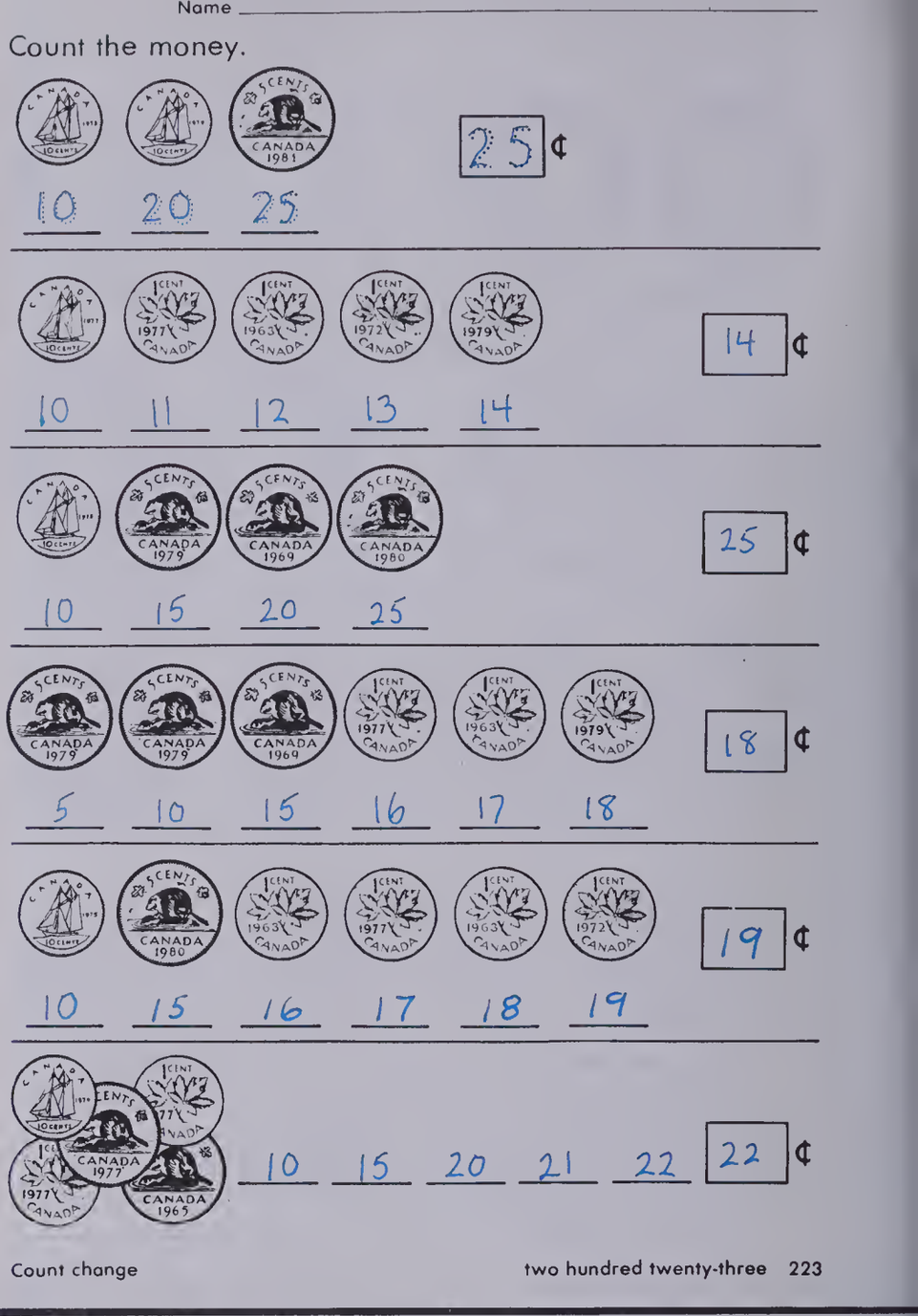
Perform these counting exercises as a group.

1. Count by 5s to 50¢ using nickels.
2. Count by 10s to 50¢ using dimes.
3. Count on from 20¢ to 25¢ using pennies.
4. Count on from 10¢ to 25¢ using nickels.
5. Count to 17¢ using 3 nickels and 2 pennies.
6. Count to 17¢ using 1 dime, 1 nickel, and 2 pennies.
7. Count to 25¢ using 1 dime, 2 nickels, and 5 pennies.
8. Count to 27¢ using 2 dimes, 1 nickel, and 2 pennies.

Teaching the Lesson

Display a price tag showing the amount 17¢. Have a student pay you a quarter (25¢) in return for the tag. Ask the class if the exchange was fair; if someone is owed change. Determine that the student should get change for the trade to be fair. To make the change, start at 17¢ and count to 25¢ using pennies. Determine that a faster way is to use 3 pennies and 1 nickel.

Repeat this activity with price tags showing 8¢, 3¢, and 11¢. Count out the change for each from 25¢.

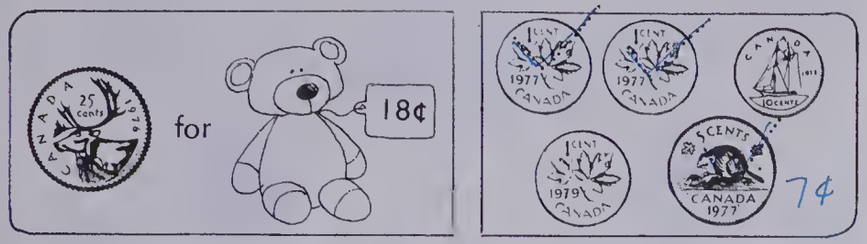


Using the Pages

- It is recommended that pages 223 and 224 be assigned separately. Before using page 224, you may wish the students to gain experience with the activities described in the Reinforcement section.

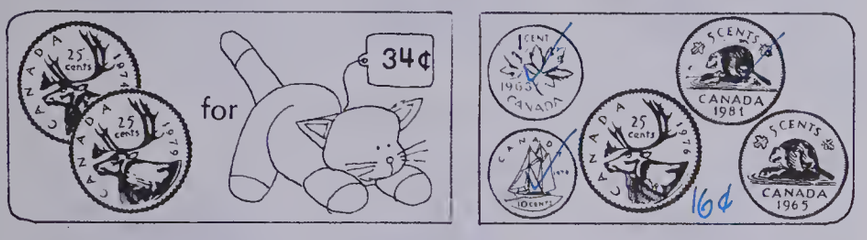
Pay for an animal.

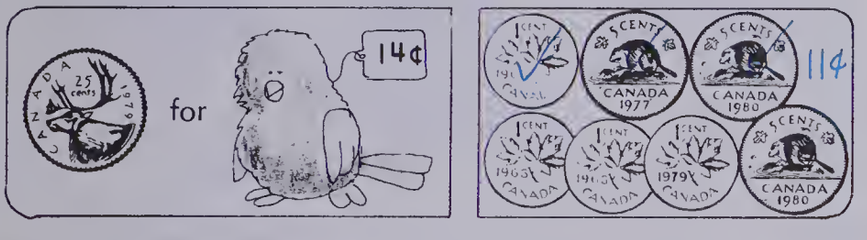
Check your change.







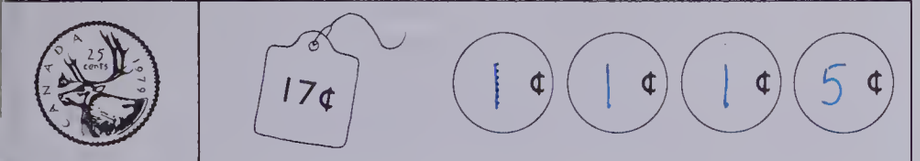


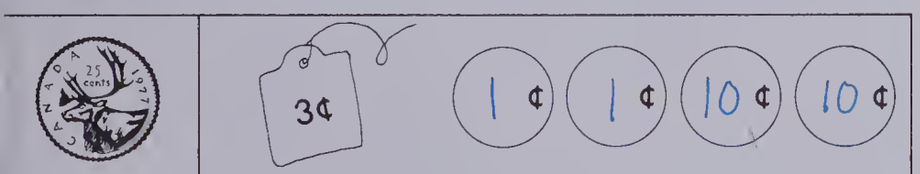


Extra Practice

Worksheet M15
Pages 223-224

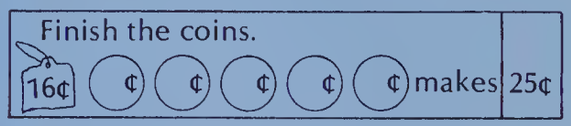
Show your change.

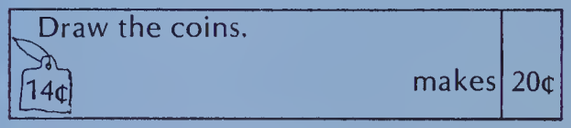




Reinforcement

Construct acetate-covered work cards for students to practise counting change. A beginning and ending amount are always given. Some cards may provide cues for the number of coins required for change; others might provide no hints. Students complete the coin amounts with crayons or a grease pencil.

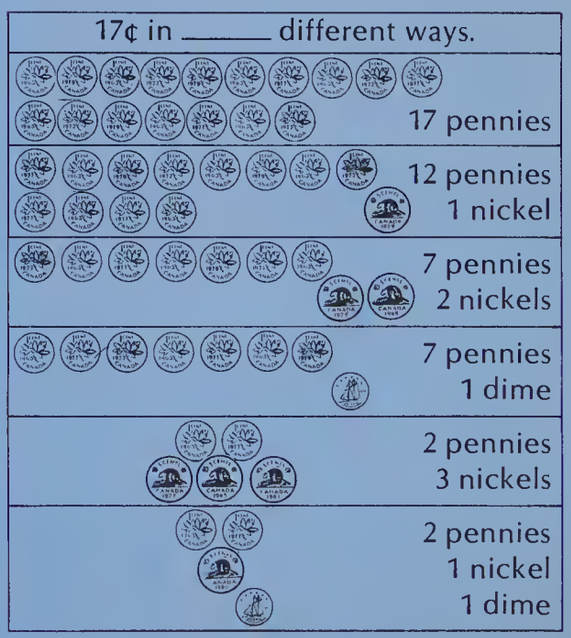




Enrichment

1. Reopen the classroom store (discussed in detail in Units 3 and 5). Demonstrate for the students how to orally count out change by beginning with the price of the item and ending with the amount of money received by the clerk. Organize pairs of students to practise this skill. Provide them with either real coins or duplications of the illustrations found in the book.

2. Normally, change can be made using a variety of combinations. Challenge students as a group to come up with all the ways for a variety of amounts. Post the results on a bulletin board as shown below.



UNIT 11 LESSON 7

Objective M16

Experience mass and non-standard units using a pan balance.

Vocabulary

Mass, lighter, heavier, pan balance
Direction words: Which has the greater mass? A ____ has the same mass as ____ .

Materials

A set of pan balances
New crayons bundled into sets of 10
Chalkboard eraser, book, small stuffed animal, balloon, lead

Introducing the Lesson

Ask the students to guess which has the greater mass:
a. the book or the eraser?
b. the book or the stuffed animal?
c. the eraser or the stuffed animal?

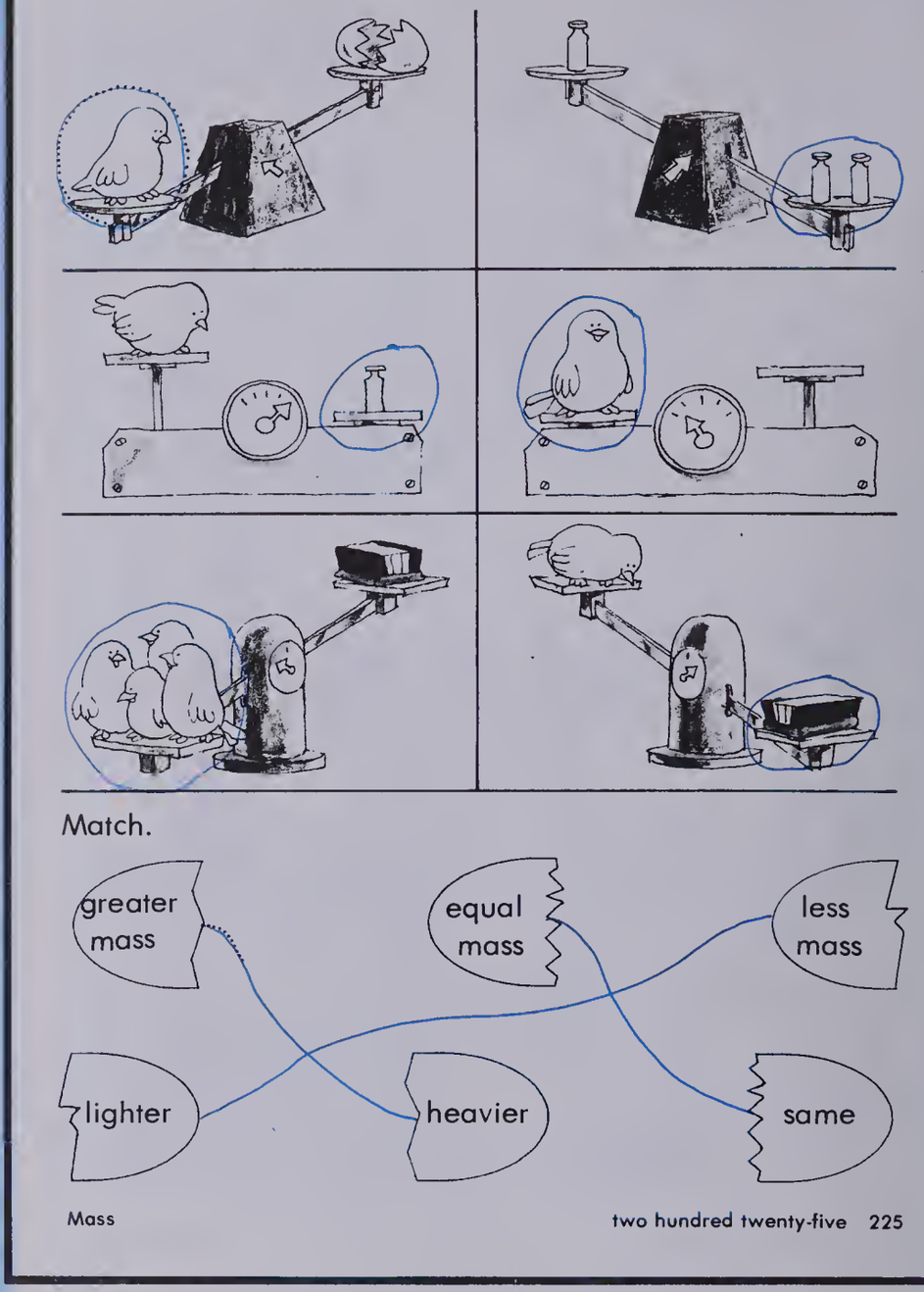
After each guess, use a pan balance to check the answer. Take this opportunity to discuss the position of the pan balance with regard to greater and lesser mass. Demonstrate, using the balloon and the piece of lead, that a larger object does not necessarily have greater mass.

Teaching the Lesson

Show that a bundle of 10 crayons has the same mass as 10 separate crayons using a pan balance.

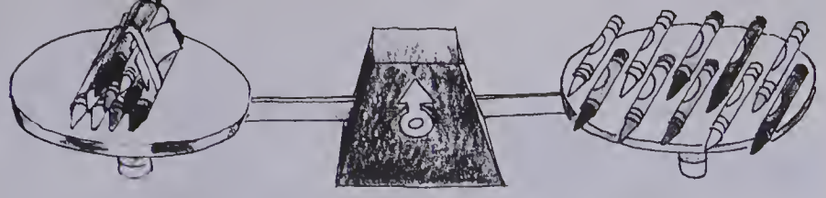
Find the mass of the book in non-standard units of mass; namely, new crayons. Make use of the bundled crayons to facilitate this process. For example, if the book balances with 5 crayon bundles and 3 extra crayons, then the book has a mass of 53 crayons.

Repeat this measurement activity for the small stuffed animal and for common items in the classroom.

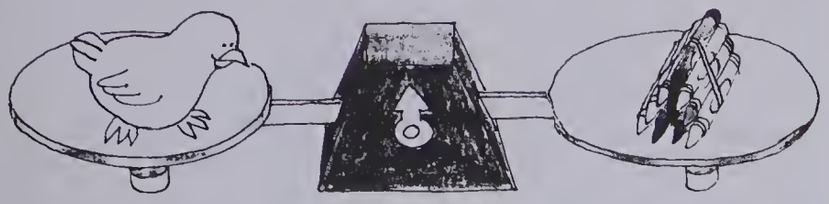


Using the Pages

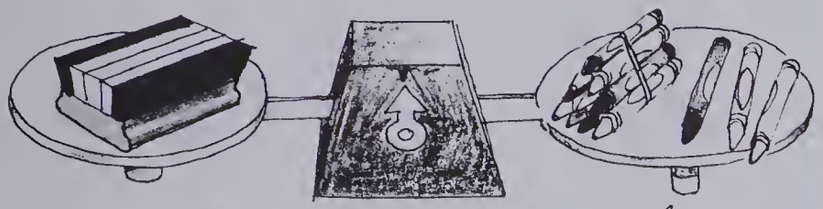
- Study the vocabulary on page 225 together before assigning the page.
- The exercise on page 226 can be viewed also as review of place value and/or addition skills. Common mass sets are usually grouped in some fashion; the place value grouping on page 226 requires no computation, allows for flexibility in weighing objects, and reinforces important numeration concepts.



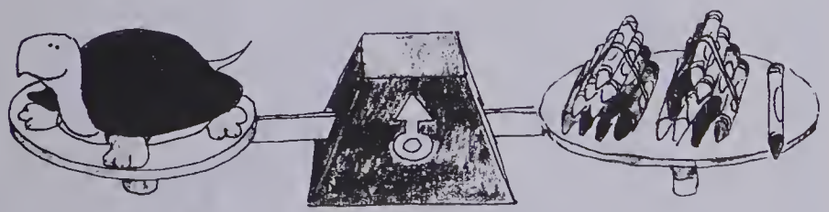
A  has the same mass as 10 .



A  has the same mass as 10 .



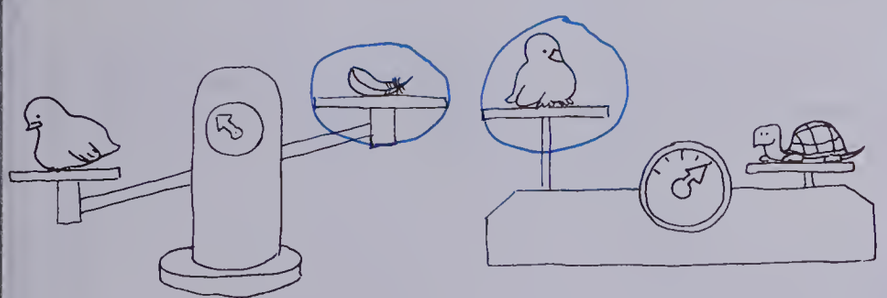
A  has the same mass as 13 .



A  has the same mass as 21 .

Extra Practice **Worksheet M16**
Pages 225-226

Which is *lighter*?



Reinforcement

1. Provide a collection of objects whose masses the students can compare with a pan balance. Show the students the following format for recording masses from heavier to lighter: a guess based on sight, a guess based on feel, and a measurement on the pan balance.

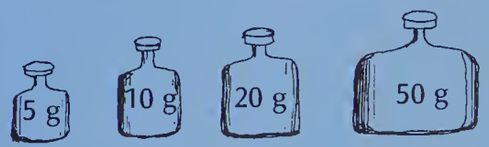
	Heavier ⟵ Lighter
Guess:	top boat box cow pencil
Guess:	boat box top cow pencil
Measure:	box boat cow top pencil

2. Allow the students to find the masses of objects using the non-standard crayon units discussed in the lesson. Provide 9 bundles of 10 crayons and 9 spare crayons. Have the students record and display their investigations on a bulletin board near the pan balance centre.

Name_____
The boat has a mass of 43 crayons.
"The Unhappy Duck" has a mass of 79 crayons.
My shoe has a mass of 95 crayons.

Enrichment

Introduce the students to a gram mass set. Show them how to add the masses used to balance an object.



5 +10 = 15 → 15 +20 = 35 → 35 +50 = 85 grams

UNIT 11 LESSON 8

Objective M17

Estimate and measure mass in kilograms.

Vocabulary

Kilogram, scales, mass, measure, estimate, more, less
Direction words: Print more or less. Guess the mass. Then use scales.

Materials

Kilogram scales (4 to 6)
Pan balance
One kilogram mass, softball, eraser
Small and large boxes of chalk

Introducing the Lesson

Pass around a one kilogram mass. Have the students guess whether a variety of objects from the classroom have a mass which is *more* or *less* than one kilogram. Allow as much handling of the materials as necessary. Compare each object with the one kilogram mass using a pan balance.

Teaching the Lesson

As a group, place 15 to 20 medium-sized objects in order according to mass. Use a pan balance for the light objects and a bathroom scale for the heavy objects. You may need to show some of the students how to read the dial of the scales. Relate your discussion of the kilogram dial to the *counting on* skill practised in Lesson 6 with coins and in Lesson 7 with bundled crayons.



Print **more** or **less**.



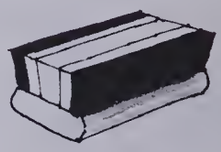
less than one kilogram



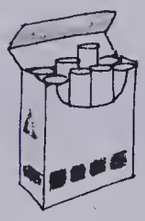
more than one kilogram



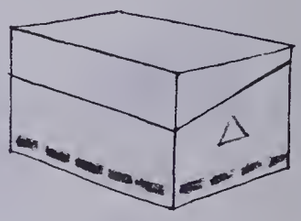
less than one kilogram



less than one kilogram



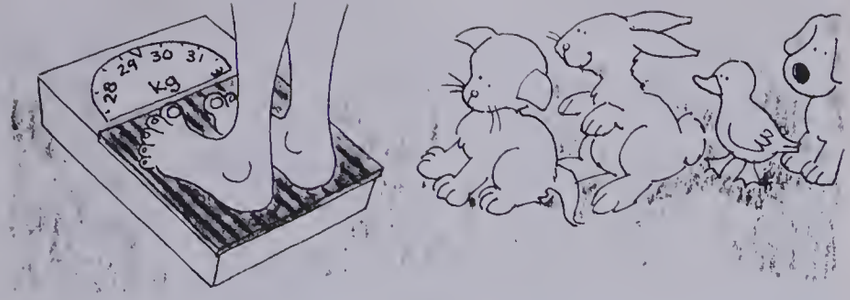
less than one kilogram



more than one kilogram

Using the Pages

- For page 227, have available some of the objects pictured as well as several one kilogram masses. Encourage the students to make a guess first and then to check their guesses.
- Before assigning page 228, have the students add another 7 objects to the empty spaces on the mass chart. Require the students to make thoughtful guesses first. Check these before you permit students to measure the masses using a kilogram scale.



Guess the mass. Then use **scales**. Answers will vary.

	Guess.	Measure.
big can of juice		
big book		
me		

Extra Practice

Worksheet M17
Pages 227-228

Print in the correct box.

more than one kilogram			less than one kilogram
tiger	tiger	fox	fly
elephant	fly	bat	robin
eagle	elephant	frog	squirrel
fox	robin	goldfish	bat
lion	eagle	lion	frog
moose	squirrel	moose	goldfish

Reinforcement

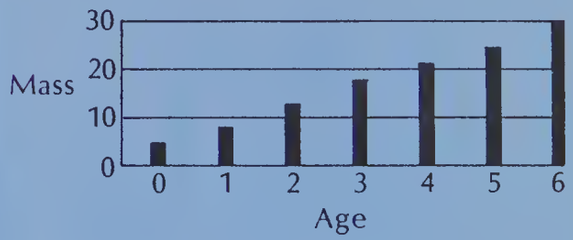
1. Organize a survey of body mass with your students. Ask them to record the masses of adults and older children and to report these to the class. As a group come up with a way of organizing and summarizing all the information.

2. Allow students to post their names on a mass graph. The size of the name tag should be the same for each student.

20 kg-25 kg	25 kg-30 kg	30 kg-35 kg	35 kg-40 kg
Mary	Al	Harry	Gary
	Mel	Joan	Frank
	Nan	Jim	
	Bill		

Enrichment

1. Make a graph showing the birth mass of students in your class. Determine from parents if any extensive (yearly) records of mass have been kept for any of your students. If so, show this information on a bar graph.



2. Arrange activities that show the *additive* nature of mass. Find the mass of two objects on the scale. Add the masses together. Then check the addition by finding the mass of the two objects together. Because of rounding errors, some of the answers will be off by 1 kg.

Jim's desk 15 kg
Jim's chair + 6 kg
Should be 21 kg together
They are 21 kg.

UNIT 11 LESSON 9

Objective M18

Experiment with capacity using litre and half litre containers.

Vocabulary

Litre, half litre, container, guess, measure
Direction words: How much does it hold? Which holds more? Print more or less.

Materials

Large collection of dairy product cartons
A set of buckets
Water or puffed wheat

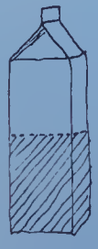
Introducing the Lesson

Display four dairy product containers: 2 L, 1 L, 500 mL, and 250 mL. (Cover the capacity labels with masking tape.) Have the students guess how many full 500 mL containers it takes to fill a 1 L container. Check the answer by performing the activity using the two containers and a bucket of water.

Repeat a similar procedure for the following combinations:
1. chocolate milk (500 mL) and skim milk (2 L).
2. homogenized milk (1 L) and skim milk (2 L).
3. cream (250 mL) and homogenized milk (1 L).

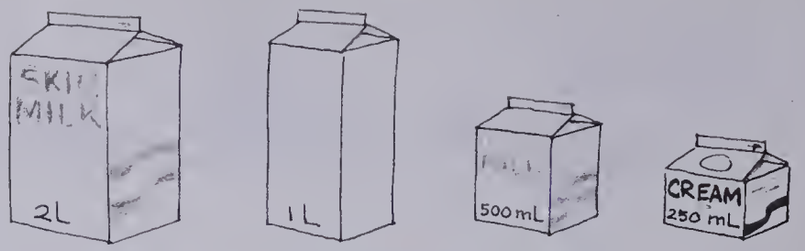
Teaching the Lesson

Explain that the homogenized milk container holds *one litre*. Discuss whether the other containers hold more or less than one litre. Discover that the chocolate milk container (500 mL) fills half of the litre container. Illustrate this situation with a region picture, as shown below. Decide that the chocolate milk container holds a half litre.



500 mL of chocolate milk fills half of a litre container.

Name _____



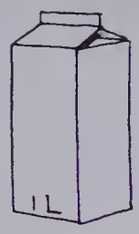
How much does it hold? Answers will vary.

	Guess.	Measure.
holds	____	____
holds	____	____
holds	____	____
holds	____	____

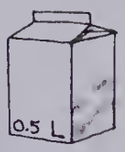
Capacity two hundred twenty-nine 229

Using the Pages

- Have students guess answers for the first column on page 229. Then permit them to use the containers and water to complete the page.
- Page 230 requires the students to compare the capacities of containers.

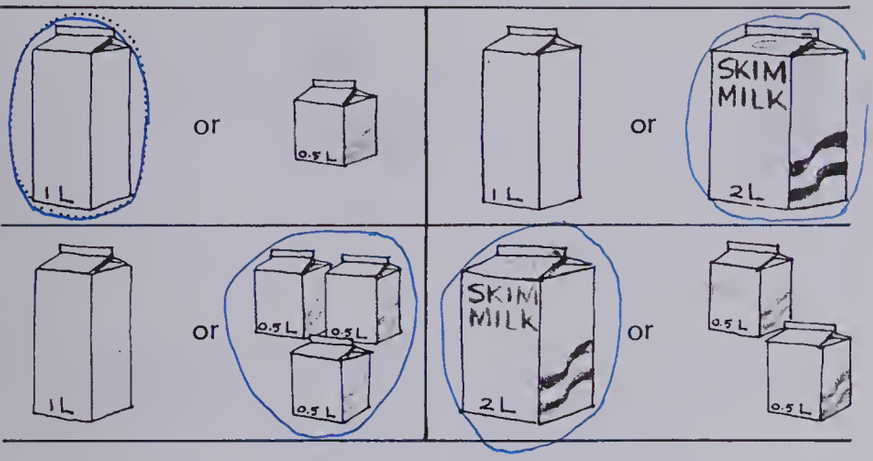


holds **one litre**.



holds a half litre.

Which holds more?



Print **more** or **less**.



less than one litre



more than a half litre



more than one litre



less than a half litre



less than one litre



more than a half litre

xtra Practice

Worksheet M18
Pages 229-230

omplete the sentences.



holds one litre

half litre
one litre



holds a half litre

Reinforcement

1. Ask the students to bring clean containers from home. Place these in a centre with containers holding 2 L, 1 L, 500 mL, and 250 mL. Have the students order the containers from largest to smallest capacity. Encourage them to use water to compare the capacities. Number each container so that an answer key can be provided for this activity.



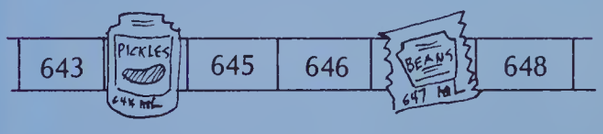
2. Make four collages displaying pictures of or labels from common containers that hold about 2 L, 1 L, a half litre (500 mL), and a fourth litre (250 mL).

Enrichment

1. Introduce the millilitre unit of capacity. Demonstrate for the students how to measure the capacity of small containers using a 1000 mL beaker. Provide about ten containers for them to measure. Require the students to record their results in a clear manner. Display the students' work on a bulletin board.

2. Collect a set of containers with labels indicating capacity in millilitre units. Have the students order the containers from smallest to largest capacity by comparing the number of millilitres on each label. Provide an answer card for this activity.

3. Peel off labels from food cans that show capacity in millilitres up to 1000 mL. Attach these to the class number line to 1000. Try to find as many numbers as possible over a 3 week period.



UNIT 11 LESSON 10

Objective M19

Identify the use of common measurement tools.

Vocabulary

Measurement, pan balance, mass, kilogram, cubes, length, centimetre, beaker, litre, thermometer, temperature, degrees Celsius, clock, time
Direction words: How long? How heavy? What time? How hot? How much water?

Materials

Pan balance,
Centimetre ruler,
1 L beaker,
Thermometer,
Clock
Three labels for each tool: a name tag, a measurement unit tag, and a measurement question tag.

Introducing the Lesson

The purpose of this lesson is to consolidate the students' measurement concepts and vocabulary by focusing on common measuring tools. Display the instruments listed above. Have the students name each instrument. Label each with a name tag. Mix the name labels together and challenge the students to make the matches again.

Teaching the Lesson

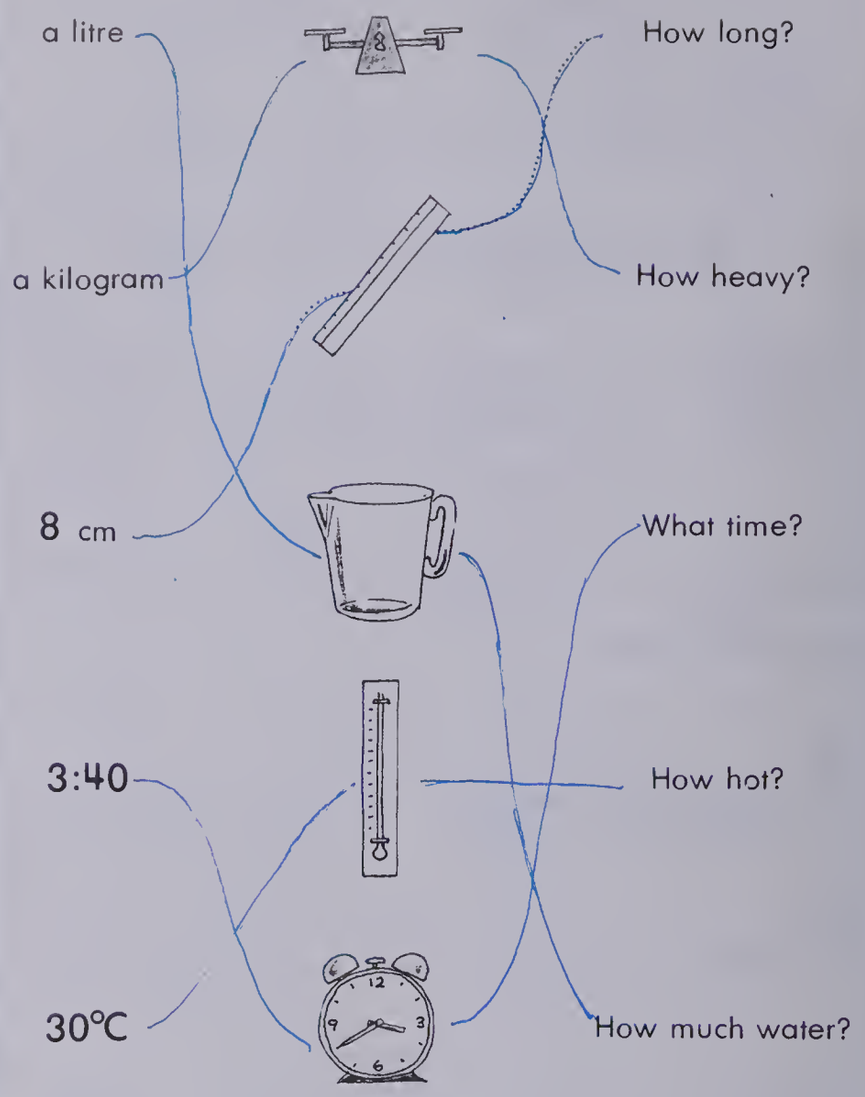
Display five measurement question tags as listed on page 231. Determine together which tools could help to answer each question. Mix the question tags and challenge someone to make the matches.

Display five measurement unit tags (a litre, a kilogram, a centimetre, an hour, and 0°C). As a group, decide how to associate the measurement unit tags with the five measurement tools. Then mix the unit tags and ask someone to match them with the tools.

Problem Solving Activities

Assign Level 2, Unit 11

Which measuring tool?



Using the Page

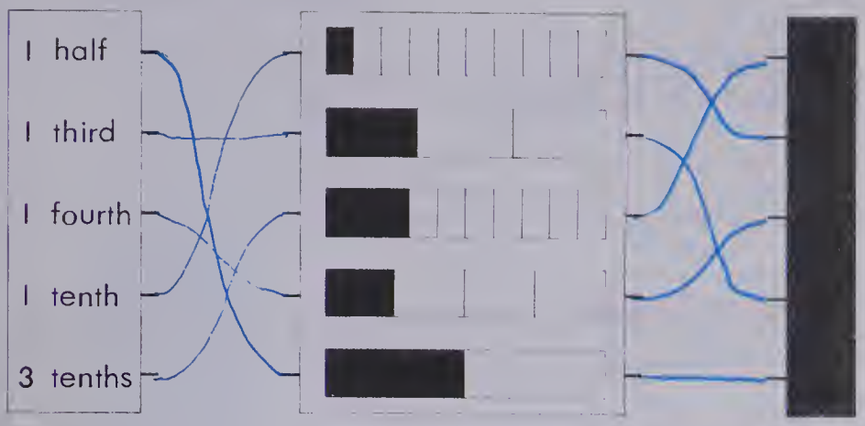
- For page 231, show the students how each measurement tool is to be matched with a measurement example and a measurement question.

UNIT 11 TEST

Part 1: Identify the fractions $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, and the tenths.

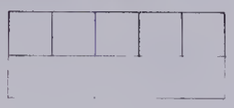
Part 2: Identify and print tenths from 0.1 to 0.9.
Part 3: Determine the minutes to and the minutes after the hour.
Part 4: Count and make change for 25¢.
Part 5: Compare mass and capacity.

Match.



Print the decimal.

4 tenths 0.4



0.5

Fill the blanks.



15 minutes

to 7

Count the money.



10 15 16

16 ¢

Print **more** or **less**.



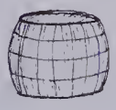
less than a kilogram



more than a kilogram



less than a litre



more than a litre

Extra Practice

Worksheet M19
Pages 231-232

Complete the sentences.

A  is a pan balance

A  is a ruler.

A  is a clock.

A  is a thermometer

a thermometer
a ruler
a clock
a pan balance

Informal Assessment

For students who seem to have difficulty with the unit test, these assessment items will provide more specific information than a written test.

1. The student can identify orally these fractions from the unit fraction cards.



2. The student is able to draw and colour the following fractions on a square or circle.

one half, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{1}{4}$

3. The student can colour and say the following fractions.

$\frac{1}{10}$, $\frac{3}{10}$, $\frac{7}{10}$

4. The student is able to identify and write the associated decimal.

$\frac{3}{10}$ $\frac{9}{10}$



5. The student can read the following times from a clock using the phrases *minutes after* and *minutes to*.
7:10, 3:20, 4:50, 8:45

6. The student can count using these coins.



The student is able to count on using these coins.



7. The student is able to use a pan balance to compare the masses of two objects.

8. The student can choose a one kilogram mass from a set of 5 objects.
a pencil, a reader, 1 kg object, a bat, a chair

9. The student can choose a one litre container from a set of containers of various capacities.

10. In discussion, the student is able to identify the tools used to find measurement answers for the following questions.
a. How long?
b. How heavy?
c. How much liquid?
d. How hot?
e. What time?

UNIT 12
Multiplication and Division

Theme: Outdoor Activities

Lesson		Objective	Pages
1	N28	Count by 2s; recognize odd and even numbers.	233-234
2	A48	Multiply by 2 with products to 20.	235-236
3	A49	Multiply by 5 with products to 20.	237-238
4	N29	Count by 3s and 4s.	239-240
5	A50	Multiply by 3 with products to 18.	241-242
6	A51	Multiply by 4 with products to 20.	243-244
7	A52	Multiply by 1; review multiplication facts with products to 20.	245-246
8	A53	Prepare for division.	247-248
9	A54	Divide using the division symbol.	249-250
10	A55	Divide with dividends to 20.	251
Test		Multiplication and division	252

Vocabulary

odd numbers
even numbers
count by 2s
groups of
times
multiplication
multiply by 2
multiply by 5
whisper count
count by 3s
count by 4s
multiply by 3
multiply by 4
multiply by 1
How many groups of?
divided by
division
divide

Printed Directions:

Find the pattern and finish colouring.
Colour the even numbers.
Colour the odd numbers.
Join the dots.
Use the scoreboard to help you.
Complete and colour each team's ball.
Complete each path to the other side.
Complete each pattern.
Count by 3s to join the red dots.
Count by 4s to join the black dots.
How many wheels?
Multiply.
How many legs?
How many bees?
Circle the groups.
Circle the groups and complete each division.
Divide.

Materials

Multiplication picture cards for products to 20:



Repeated addition cards:

2 | 2 + 2 | 2 + 2 + 2 | ...

Multiplication meaning cards for products to 20:

1 group of 2 | 2 groups of 2 | ...

Multiplication name cards for products to 20:

1 × 2	2 × 2	3 × 2	...	9 × 2
1 × 3	2 × 3	...		6 × 3
1 × 4	2 × 4	...		5 × 4
1 × 5	2 × 5	...		4 × 5

Division name cards for dividends to 20:

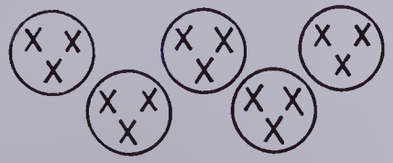
2 ÷ 2	4 ÷ 2	...	18 ÷ 2
3 ÷ 3	6 ÷ 3	...	18 ÷ 3
4 ÷ 4	8 ÷ 4	...	20 ÷ 4
5 ÷ 5	10 ÷ 5	...	20 ÷ 5

Numeral cards: 1 to 20

cardboard triangles
cardboard rectangles
interlocking cubes
egg cartons
graph paper
chart paper
beans
crayons
dice
scissors
stickers
tape

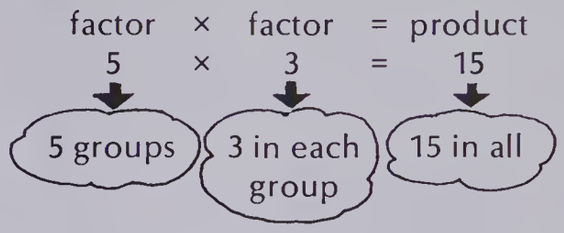
About This Unit

Unit 12 introduces the multiplication concept and the basic facts for the 2, 3, 4, and 5 times tables up to products of 20. The multiplication concept is developed through groups of equal size and the operation of addition with which the children have had considerable experience already. Repeated addition of the same number is related to the multiplication of that number.



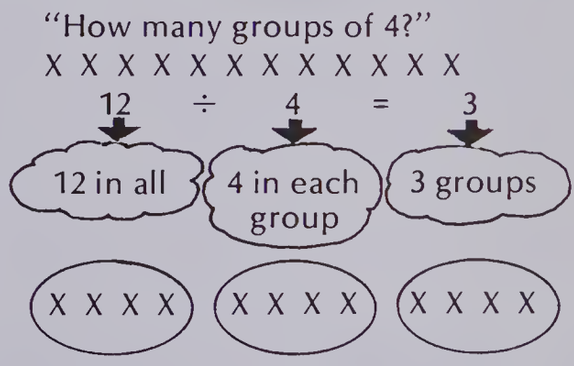
5 groups of 3:
3 + 3 + 3 + 3 + 3
5 threes:
5 × 3

The first factor of the multiplication sentence tells how many groups; the second factor tells how many are in each group; and the product tells the total number in all the groups.



It is important that counting lessons precede the related lessons on the times tables. In this way, students are first familiarized with the counting sequences and can then use them to help solve multiplication in the subsequent lessons. As this is the only unit on multiplication, the development of the concept for multiplication is of great importance. Therefore, concrete materials and real-world references are used as much as possible, and their use should be encouraged at all times. Recall of the multiplication facts is not expected at this level.

Division is introduced in Unit 12 mainly for enrichment. Only those students who have a firm grasp of the multiplication concept should continue on to those lessons. The concept of division that is taught is based on the quantitative or measurement idea. For this idea, the size of each group and the total number of objects are given, and the students find the number of equal groups.



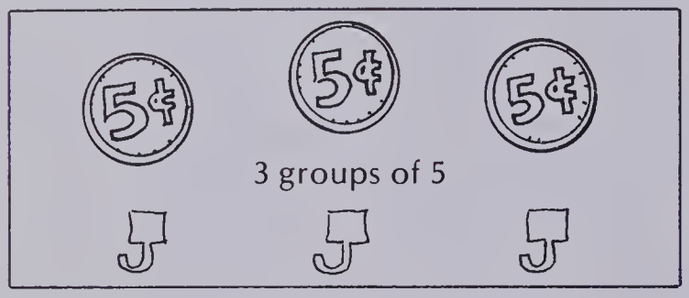
Although the division symbol ÷ and division sentence are introduced, the main emphasis at this level is on development of the concept for the operation of division. Therefore, concrete materials should be provided at all times. Knowledge of the basic division facts is not expected.

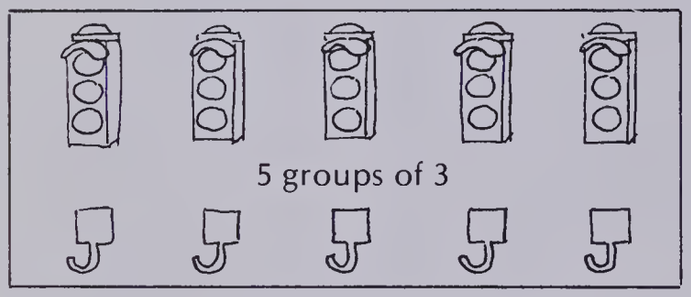
Ideas

The theme of Unit 12 is *Outdoor Activities.* Teachers may wish to extend the ideas from the workbook illustrations to incorporate other subjects such as writing, reading, and art. Some suggestions for extension are given in the Enrichment section of selected lessons.

1. Bulletin Board Display
Make a display as shown.
Use or draw real things such as nickels, stop-lights, etc.

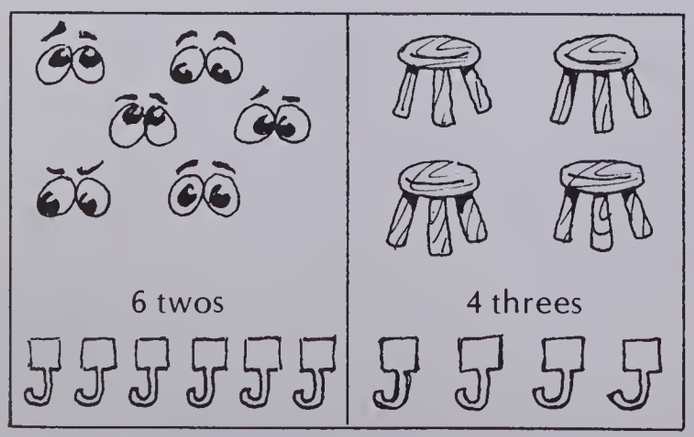
How to Make 15?

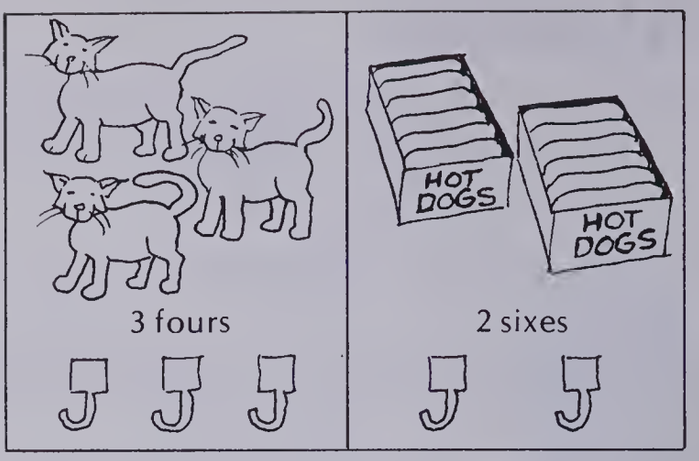




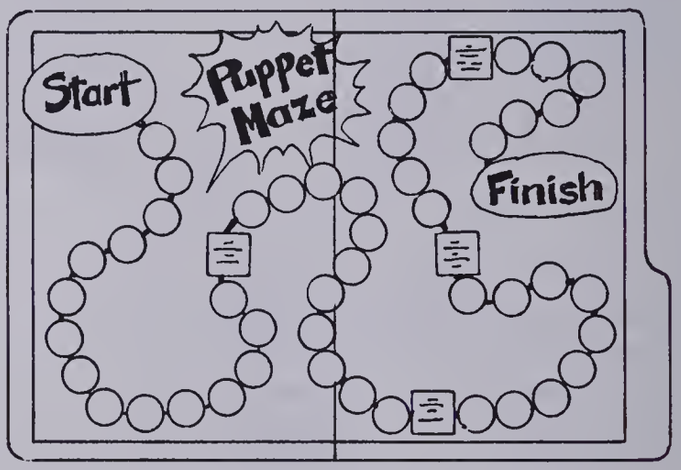
As the unit progresses, add the following cards to the hooks.
counting sequence
a. 5, 10, 15
b. 3, 6, 9, 12, 15
repeated addition
a. 5 + 5 + 5
b. 3 + 3 + 3 + 3 + 3
multiplication
a. 3 × 5
b. 5 × 3

How to Make 12?





2. Multi-Purpose Game Boards
Prepare game boards by using a large file folder and stickers. Decide on a theme and a name, like "Puppet Maze", "Shoot for the Moon", or "Ready, Set, Go!". Open and lay the folder flat to make a game board. Place the stickers on the board to make a track. For interest, intersperse traps (go back one space) and rewards (go forward 3 spaces). Use at least 50 stickers for one game board.



Any set of flash cards can be used with these boards. Shuffle and lay the cards face up. Each player in turn takes a card and moves his or her marker the number of spaces corresponding to the answer for the card, e.g., $\boxed{3 \times 4}$. The player moves forward 12 spaces. Make the flash cards self-checking by writing the answers on the back.

Name _____

Pretest **Unit 12**

Count.

2 4 6 8 10 12 14 16 18

1 3 5 7 9 11 13 15 17

5 10 15 20 25

4 8 12 16 20

3 6 9 12 15

Multiply.



6 × 3 = 18 4 × 3 = 12



5 × 4 = 20 2 × 4 = 8



5 × 2 = 10 9 × 2 = 18



4 × 5 = 20 1 × 5 = 5

Divide.



8 groups of 2 in 16

4 groups of 4 in 16

16 ÷ 2 = 8 16 ÷ 4 = 4

Name _____

Post-test **Unit 12**

Count.

2 4 6 8 10 12 14 16 18

1 3 5 7 9 11 13 15 17 19

3 6 9 12 15

4 8 12 16 20

5 10 15 20 25

Multiply.



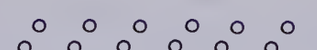
3 × 3 = 9 5 × 3 = 15



4 × 4 = 16 5 × 4 = 20



6 × 2 = 12 3 × 2 = 6



2 × 5 = 10 3 × 5 = 15

Divide.



4 groups of 3 in 12

3 groups of 4 in 12

12 ÷ 3 = 4 12 ÷ 4 = 3 12 ÷ 2 = 6

UNIT 12 LESSON 1

Objective N28

Count by 2s; recognize odd and even numbers.

Vocabulary

Odd numbers, even numbers, count by 2s

Direction words: Find the pattern and finish colouring. Colour the even numbers, odd numbers. Join the dots.

Materials

2 egg cartons per student
20 beans per student

Teaching the Lesson

Starting at the left of the egg cartons, ask the students to drop in two beans as shown and count how many beans. *Two.*

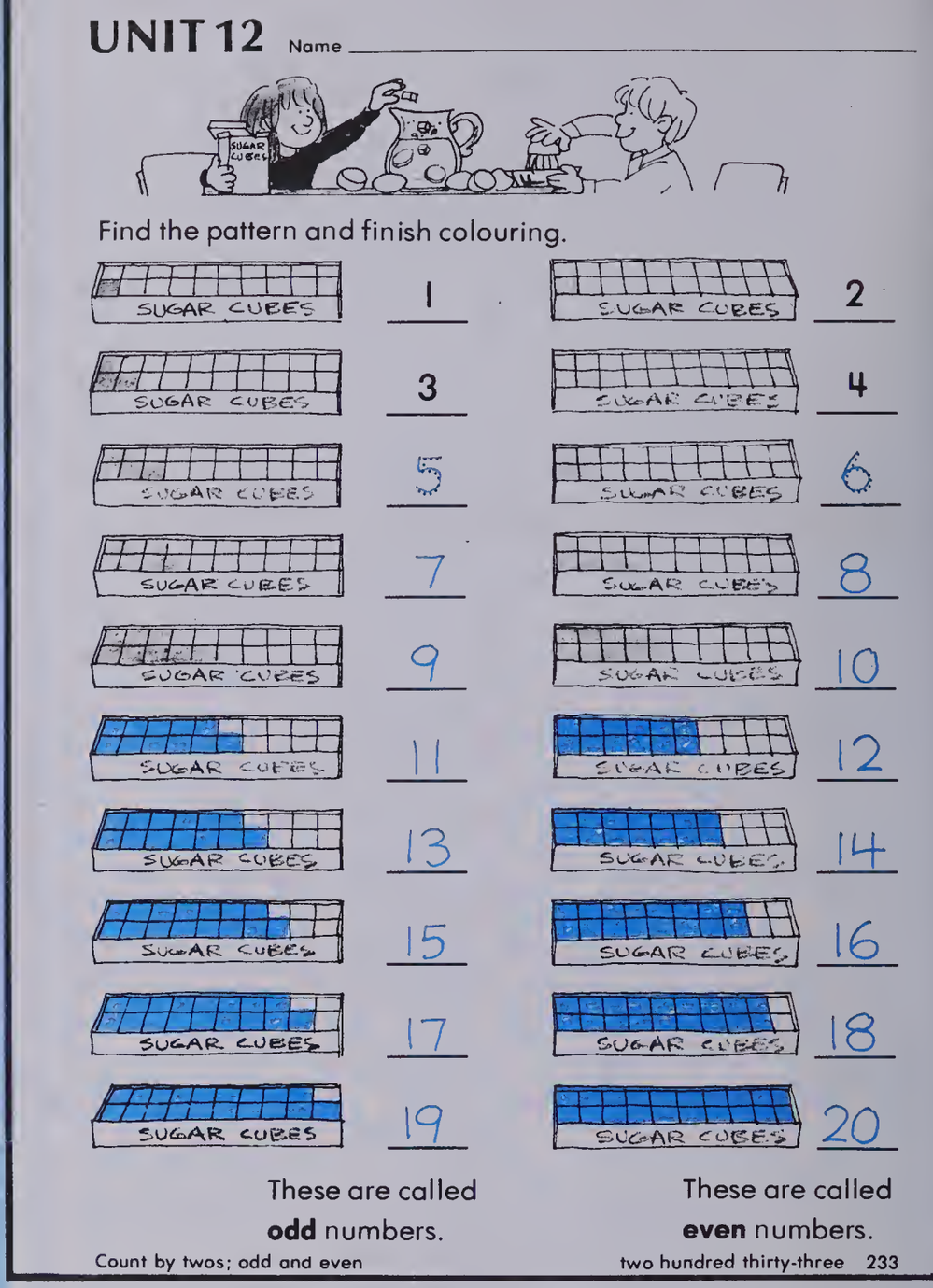


Add two more beans side by side and count how many. *Four.* Keep adding two beans at a time, orally counting by 2s to 20. Review the counting sequence by asking the students to cover the egg carton with their notebook and expose two beans at a time as they count. Write the sequence on the chalkboard: 0, 2, 4, . . . 20. Point out that each row of the egg carton contains the same number of beans. Explain that since each row has the same number or is even, the numbers we built are called *even* numbers.

This time start with one bean in the egg cartons as shown. Count how many. *One.*



Add two more beans and count how many. *Three.* Keep adding two more beans at a time, orally counting by 2s to 19. Review the counting sequence by asking the students to cover the egg carton except for the one we started with and expose 2 beans at a time as they count. Write the sequence on the board: 1, 3, 5, . . . , 19. Point out that the rows do not have equal amounts or are *not even*. One row has one more bean. Explain that another word for *not even* is *odd*. Therefore, the numbers we built this time are called the *odd* numbers.



UNIT 12 Name _____

Find the pattern and finish colouring.

SUGAR CUBES	1	SUGAR CUBES	2
SUGAR CUBES	3	SUGAR CUBES	4
SUGAR CUBES	5	SUGAR CUBES	6
SUGAR CUBES	7	SUGAR CUBES	8
SUGAR CUBES	9	SUGAR CUBES	10
SUGAR CUBES	11	SUGAR CUBES	12
SUGAR CUBES	13	SUGAR CUBES	14
SUGAR CUBES	15	SUGAR CUBES	16
SUGAR CUBES	17	SUGAR CUBES	18
SUGAR CUBES	19	SUGAR CUBES	20

These are called **odd** numbers.

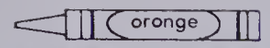
These are called **even** numbers.

Count by twos; odd and even

two hundred thirty-three 233

Using the Pages

- On page 233, the students are to continue colouring two sugar cubes at a time to complete the counting sequence started for them. Orally review the counting sequences and the vocabulary.
- On page 234, the students are to colour the even and odd numbers to 20. Practice in counting by 2s is provided with the counting sequences and the dot-to-dot.

Colour the **even** numbers 

Colour the **odd** numbers 



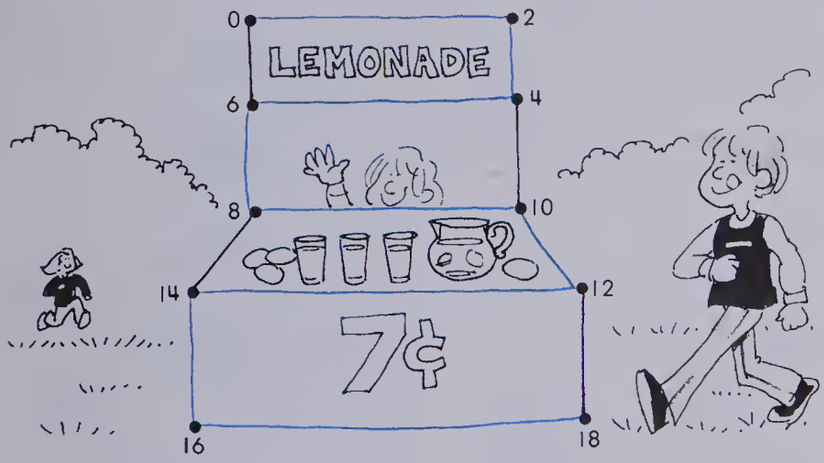
Count by twos.

2	4	6	8	10	12	14	16	18



6	8	10	12	14	16	18	20	22

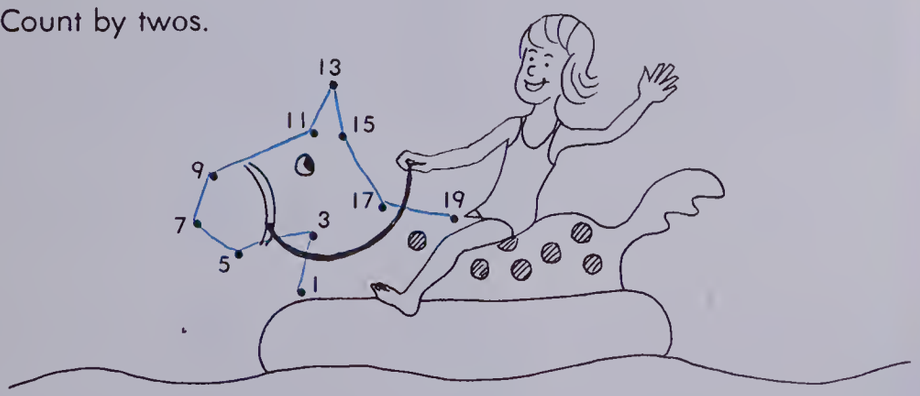
Join the dots.
Count by twos.



Extra Practice

Worksheet N28
Pages 233-234

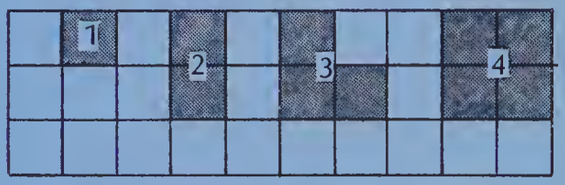
Join the dots.
Count by twos.



Reinforcement

1. Write the numbers from 1 to 20 on individual cards. Shuffle them and place them face down. Have the students take turns choosing a card and telling whether it is even or odd. Allow students to use the egg cartons and beans from the lesson to help them decide.

2. Have the students shade in squares for the numbers 1 to 20 as shown below using square centimetre graph paper. The students are to cut each shaded number out and sort according to whether it is even or odd. Then they put all the even and all the odd numbers in order from smallest to largest. Discuss the difference between even and odd numbers.



Enrichment

1. Have the students investigate the following.
a. adding two even numbers, e.g., 2 + 4
b. adding two odd numbers, e.g., 3 + 7
c. adding one even and one odd number, e.g., 4 + 9
After trying at least five examples for each situation, see if students can tell anything about the sums. Have them use their egg cartons and beans to add the examples.

2. Extend the sequence for counting by 2s from 20 to 50. Provide a chart from 1 to 50 for students to colour every second number. Discuss the pattern that emerges from the colouring.

UNIT 12 LESSON 2

Objective A48

Multiply by 2 with products to 20.

Vocabulary

Groups of, times, multiplication, multiply by 2
Direction words: Multiply. Use the scoreboard to help you.

Materials

20 counters (or beans) per student
9 pairs of shoes borrowed from the students

Introducing the Lesson

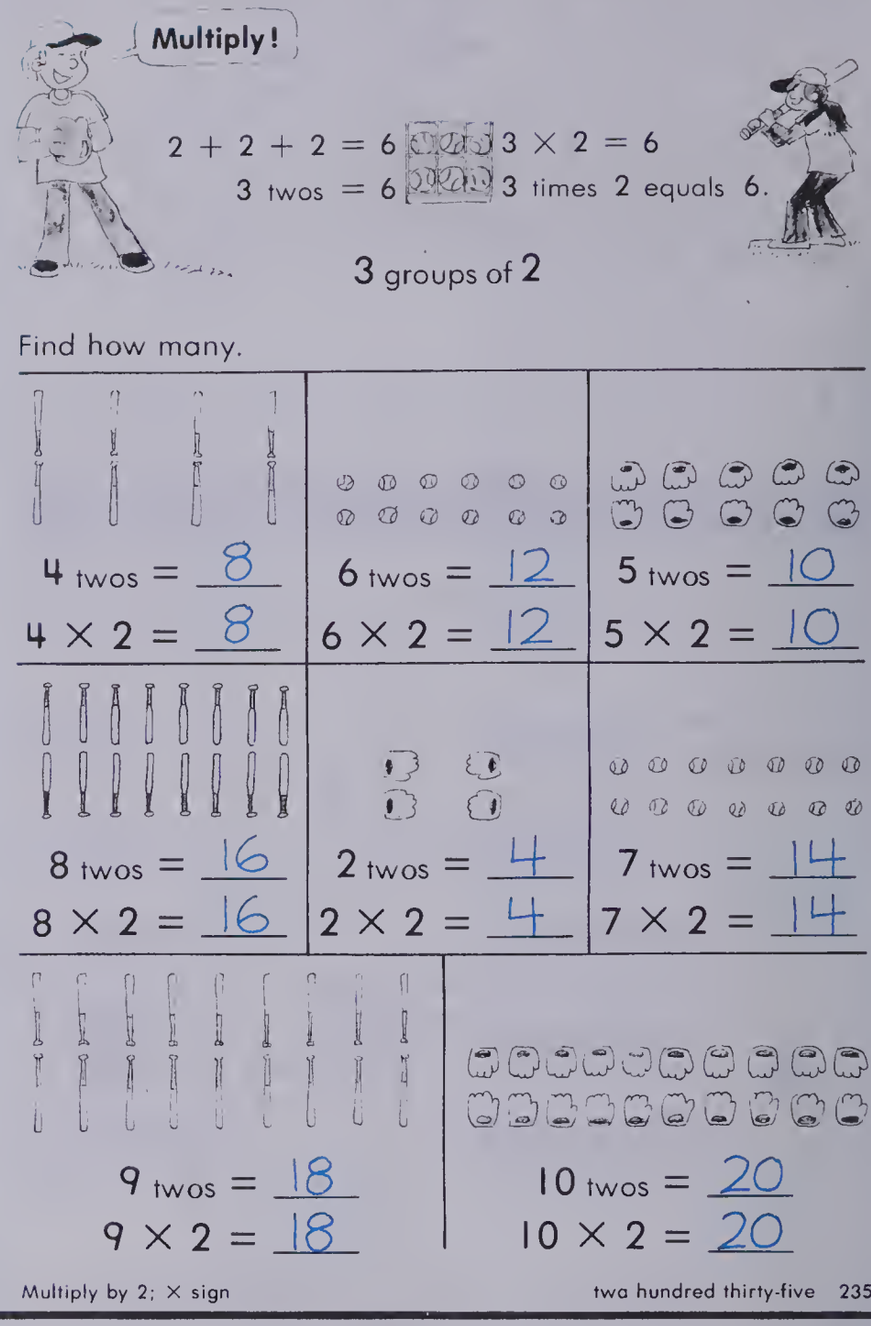
Pile the shoes in front of the class. Ask for volunteers to match them into pairs and place them on the chalkboard ledge for all to see.

Teaching the Lesson

Ask, "How many pairs of shoes are there?" *Nine.* Explain that this is the same as 9 groups of 2 or 9 twos. Write both meanings on the board. To find how many shoes altogether, we can:
a. orally count by 2s: 2, 4, 6, . . . 18
b. add 2s:
2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = 18
c. multiply by 2: 9 × 2 = 18

Write **b.** and **c.** on the board. Explain how to read the multiplication sentence as, "Nine times two equals eighteen."

Repeat the above procedure with 4 × 2, 6 × 2, and 8 × 2. Use the pairs of shoes as the concrete model.


Name _____

Multiply!

2 + 2 + 2 = 6 3 × 2 = 6
3 twos = 6 3 times 2 equals 6.

3 groups of 2

Find how many.

4 twos = 8
4 × 2 = 8

6 twos = 12
6 × 2 = 12

5 twos = 10
5 × 2 = 10

8 twos = 16
8 × 2 = 16

2 twos = 4
2 × 2 = 4

7 twos = 14
7 × 2 = 14

9 twos = 18
9 × 2 = 18

10 twos = 20
10 × 2 = 20

Multiply by 2; × sign

two hundred thirty-five 235

Using the Pages

- On page 235, the students are to use the pictures provided to multiply by twos. Discuss the example at the top of the page. Have the students read the four sentences given.
- For page 236, discuss the meaning of *inning, home, visitor,* and *runs* as shown on the baseball scoreboard. Have the students complete the runs on the scoreboard to help solve the multiplication on the rest of the page.

Keep counting.

SCOREBOARD											
Inning	1	2	3	4	5	6	7	8	9	10	11
Runs	2	4	6	8	10	12	14	16	18	20	21

Multiply. Use the scoreboard to help you.

$5 \times 2 = 10$

$3 \times 2 = 6$ $\quad$ $7 \times 2 = 14$

$4 \times 2 = 8$

$8 \times 2 = 16$ $\quad$ $9 \times 2 = 18$

$6 \times 2 = 12$

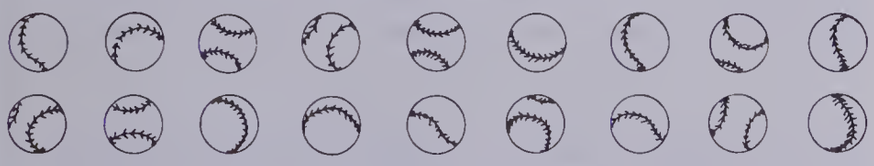


$1 \times 2 = 2$



Extra Practice **Worksheet A48**

Pages 235-236



Multiply.

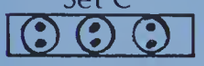
$5 \times 2 = 10$ $\quad$ $2 \times 2 = 4$ $\quad$ $6 \times 2 = 12$

$8 \times 2 = 16$ $\quad$ $3 \times 2 = 6$ $\quad$ $9 \times 2 = 18$

$4 \times 2 = 8$ $\quad$ $7 \times 2 = 14$ $\quad$ $1 \times 2 = 2$

Reinforcement

1. Prepare four sets of cards for the 2 times table as shown.

Set A	Set B
3 × 2	2 + 2 + 2
Set C	**Set D**
	3 groups of 2

Try these three activities with the cards.

a. Have the students mix them up and match all four sets.

b. Have the students mix and match only two sets, e.g., sets A and C.

c. Deal out three sets of cards to four players. Shuffle the fourth set and place it face down. Turn one card from the fourth set over. All players must play their cards that match that card. The first player to have no cards wins.

2. Have the students complete the blanks for each picture.

☐ groups of 2 equals ☐ in all.

☐ groups of 2 equals ☐ in all.

Enrichment

1. Prepare four product cards for each of the 2 times tables.

2	2	2	2		4	4	4	4

Play "How Many in All?" Take two or more sets of cards from Reinforcement Activity 1. Lay them face up in random order. Shuffle the product cards and turn them face down. Each player in turn takes a product card and tries to find a card lying face up that it matches. If successful, the two cards are kept. If not the card(s) are replaced. The winner is the player with the most cards after 5 rounds.

2. Extend the baseball theme by brainstorming baseball-related words. Have the students:

a. write the words in alphabetical order.

b. write a baseball story using some of the words.

c. play a "Baseball Spelling Bee". Form two teams. Students get three tries to spell a word aloud before they are out. Keep score by innings.

UNIT 12 LESSON 3

Objective A49

Multiply by 5 with products to 20.

Vocabulary

Multiply by 5, whisper count
Direction words: Complete and colour each team's ball. Complete each path to the other side.

Materials

Crayons: one red, blue, green, and yellow for each student.

Introducing the Lesson

Review skip counting by 5 with the following activity. Choose 10 students to come up and trace their left hand on the chalkboard.



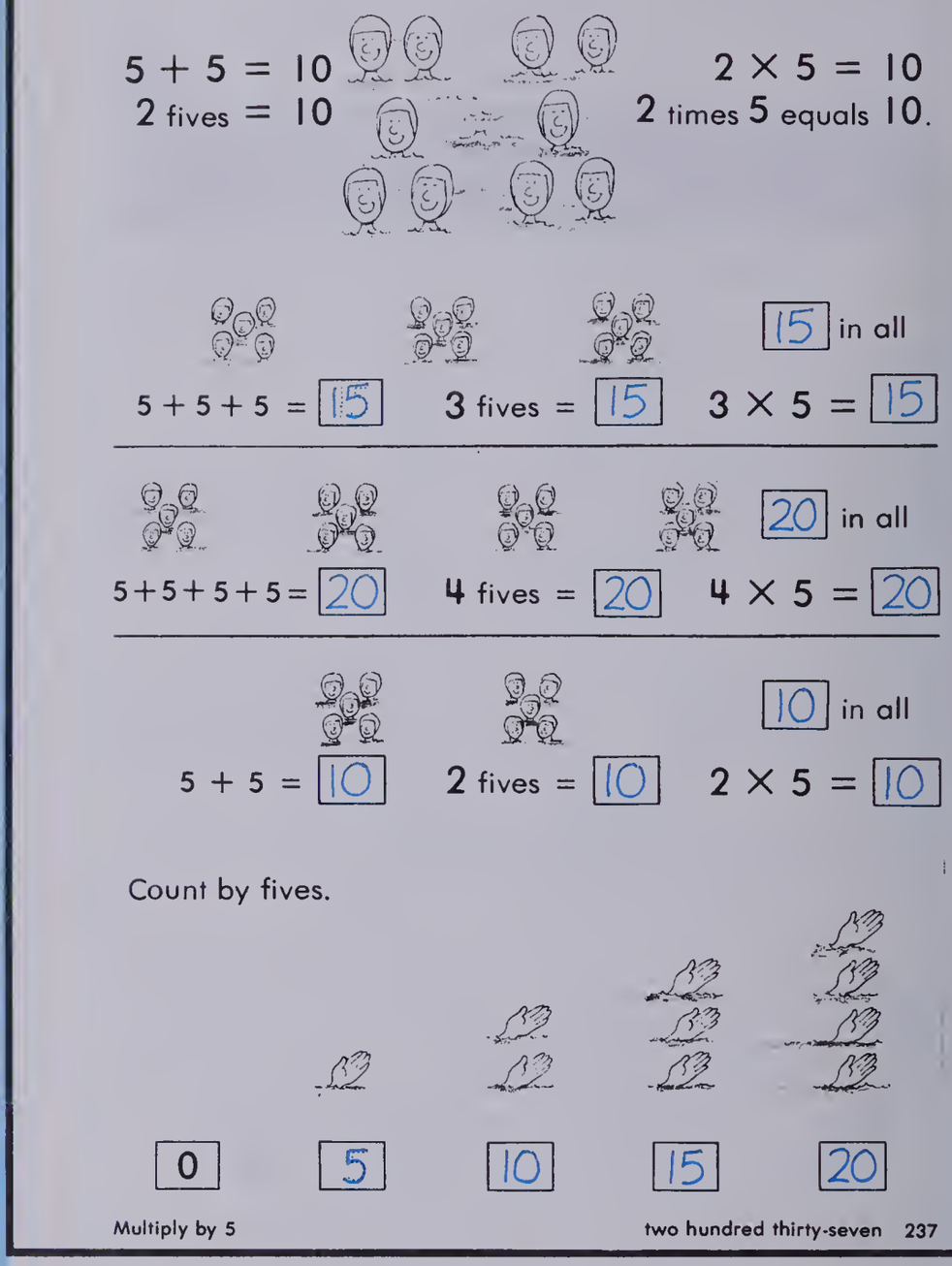
Orally count by 5s to find out how many fingers in all. If the students have difficulty, whisper count the fingers by saying in a soft voice: *one, two, three, four,* and in a loud voice, *FIVE.* Whisper, *six, seven, eight, nine,* and out loud, *TEN.* Continue to *FIFTY.*

Teaching the Lesson

Circle four hands. Explain that this is 4 groups of 5 or 4 fives. Write both meanings on the board. To find how many fingers in all, we can:
a. count by 5s: 5, 10, 15, 20
b. add 5s: 5 + 5 + 5 + 5 = 20
c. multiply by 5: 4 × 5 = 20

Write **b.** and **c.** on the board. Read each sentence.

Repeat this same procedure for three hands, two hands, and one hand.



Name _____

5 + 5 = 10
2 fives = 10

2 × 5 = 10
2 times 5 equals 10.

5 + 5 + 5 = 15 | 3 fives = 15 | 3 × 5 = 15 | 15 in all

5 + 5 + 5 + 5 = 20 | 4 fives = 20 | 4 × 5 = 20 | 20 in all

5 + 5 = 10 | 2 fives = 10 | 2 × 5 = 10 | 10 in all

Count by fives.

0 5 10 15 20

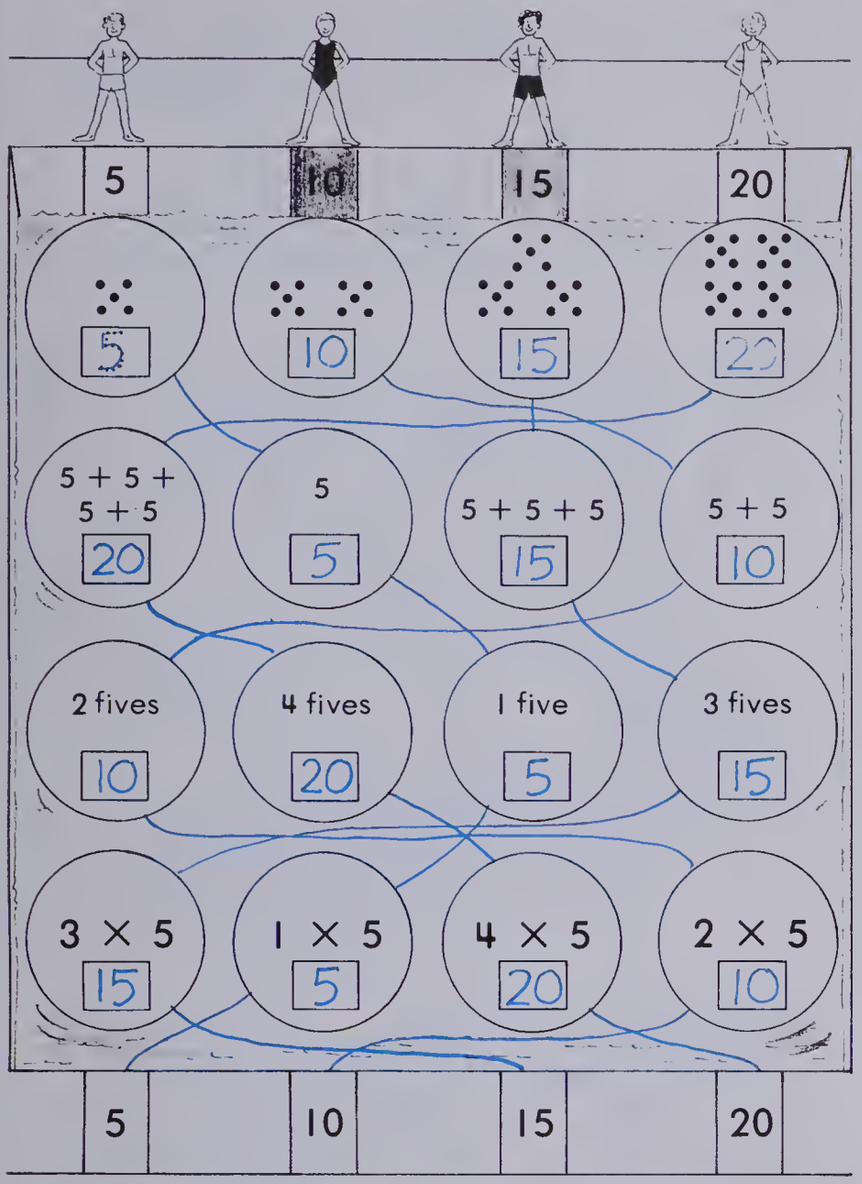
Multiply by 5

two hundred thirty-seven 237

Using the Pages

- For the top of page 237, have students orally read the four sentences given. Encourage the students to use the pictures provided to complete the sentences and the counting sequence for 5.
- For page 238, the students will need four crayons (red, blue, green, and yellow). Do the 5-team with the red crayon together. Students are to find, complete, and colour each team's ball and then draw a path to the other side.

Complete and colour each team's ball.
Complete each path to the other side.

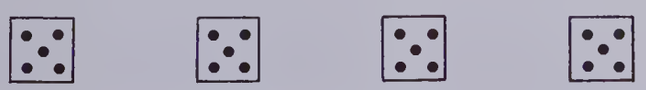


Multiply by 5

Extra Practice

Worksheet A49
Pages 237-238

Count.



5 10 15 20

Multiply.

3 × 5 = 15

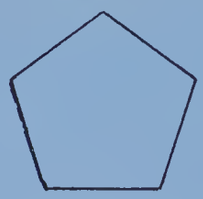
1 × 5 = 5

4 × 5 = 20

2 × 5 = 10

Reinforcement

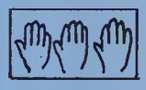
1. Show and discuss a regular pentagon. How many sides? How many corners?



Have students complete the following chart using pentagons as a model.

Number of Pentagons	Number of Sides for Each	Number of Sides in All
1	5	5
2	5 + 5	10
3	5 + 5 + 5	15
4		
5		

2. Prepare four sets of flash cards for the 5 times table.

 | 3 × 5 | 3 fives | 5 + 5 + 5 |

Try these activities with the cards.
a. Have the students mix them up and match all four sets.
b. Have a race to see who can match them the fastest.
c. Have the students mix and match only two of the sets.

Enrichment

1. Have the students extend the 5 times table to 45. Make sure they either build or draw each one to show how many in all.

2. Play "How Many in All?" as described in the Enrichment section for Lesson 2. Prepare four of each product card for the 5 times table.

UNIT 12 LESSON 4

Objective N29

Count by 3s and 4s.

Vocabulary

Count by 3s, count by 4s
Direction words: Complete each pattern. Count by 3s to join the red dots. Count by 4s to join the black dots.

Materials

6 different-sized triangles per student
5 different-sized rectangles per student
(Note: the materials from Lesson 1, Unit 5, can be used.)

Introducing the Lesson

Hand out 6 triangles and 5 rectangles to each student. Review the names and the properties of each shape, especially, the number of sides and corners.

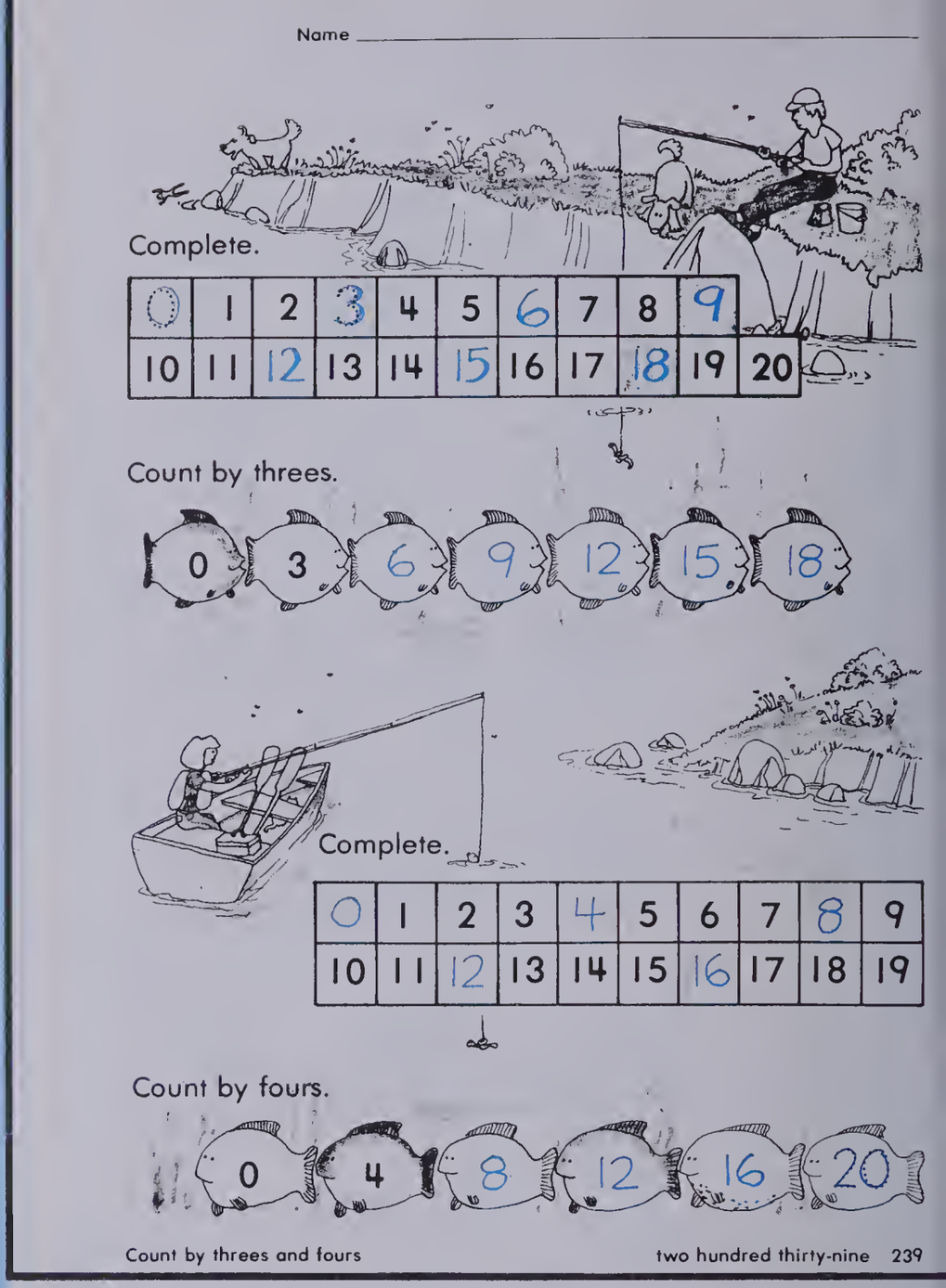
Teaching the Lesson

Ask, "How many sides do 6 triangles have?" To find out, count by ones and touch each side as you count. There are 18 sides in all. Explain that a fast way to find out is to *count by threes*. Demonstrate by touching the sides and whisper counting: *one, two, THREE, four, five, SIX, seven, eight, NINE, . . . EIGHTEEN*. Have the students whisper count in unison. Write the counting sequence on the board while the students write it on the faces of their triangles. Count by threes to find the number of corners on the triangles.

Ask, "How many sides do 5 rectangles have?" To find out, first count by ones. There are 20 sides in all. Explain that a fast way is to *count by fours*. Demonstrate by touching the sides and whisper counting: *one, two, three, FOUR, five, six, seven, EIGHT, . . . TWENTY*. Have the students whisper count in unison.

4	8	12	16	20

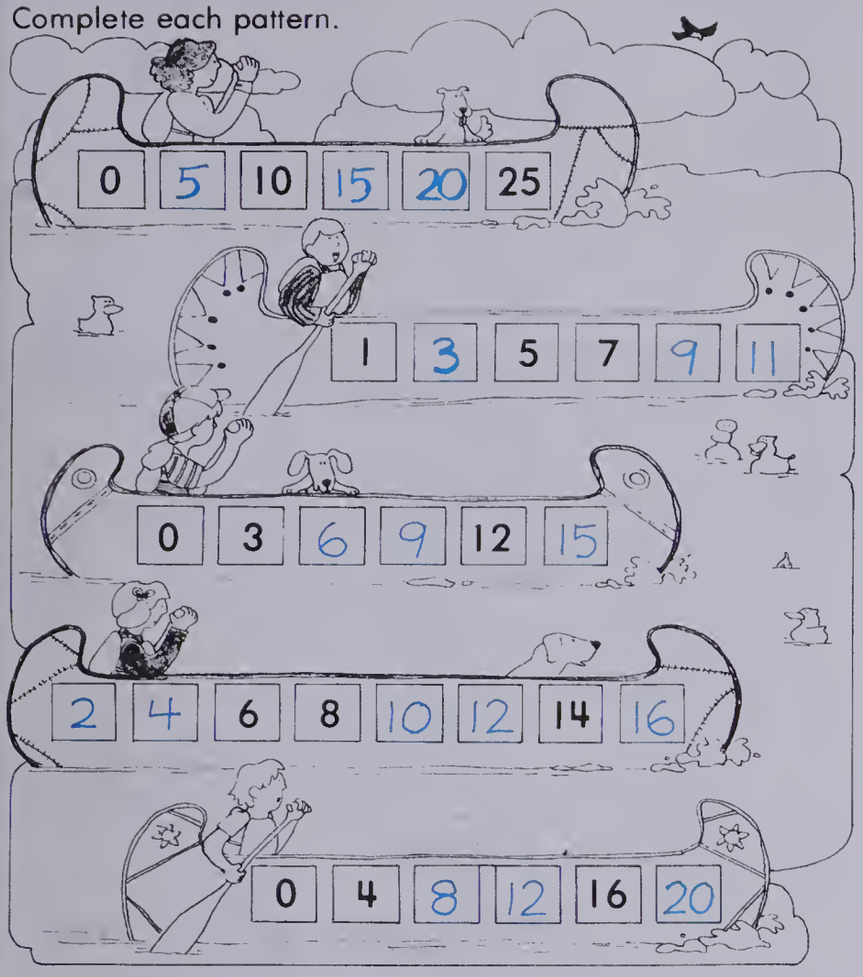
Count by fours to find the number of corners on the rectangles. Have each student place their shapes in an envelope for this lesson's Reinforcement Activity 1.



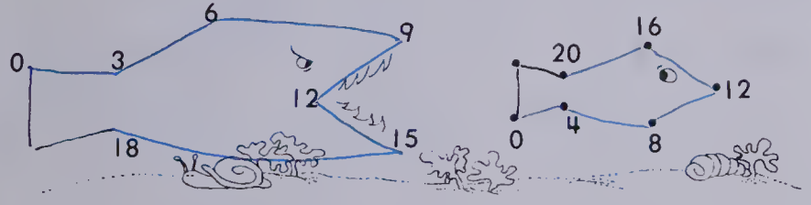
Using the Pages

- On page 239, the students are to complete the counting sequence by ones and then to use the blue shaded numbers to count by threes and fours. Note that each sequence starts with zero.
- On page 240, the students are required to determine and complete each counting pattern. A review of counting by 5s, 2s, 3s, and 4s is also provided.

Complete each pattern.



Count by 3s to join the red dots.
Count by 4s to join the black dots.



Extra Practice

Worksheet N29
Pages 239-240

Count.



4 8 12 16 20



3 6 9 12 15 18

Reinforcement

1. Have the students work in pairs to play "I Beat You" using the triangles and rectangles from the lesson. Exchange envelopes. The first person to put both sets of shapes in counting order is the winner and calls out, "I Beat You".

2. Ask the students to complete the tables.

a.

1	2	3	4
5			

b.

1	2	3
4		

c.

1	2
3	

Enrichment

Provide a chart like the following.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Have the children shade in the appropriate boxes for skip counting by 2, 3, and 4 by using different colours. Use red for counting by 2s, blue for counting by 3s, and yellow for counting by 4s.

a. List the numbers that are shaded twice: 4, 6, 8, 16, 18, 20.

b. List the numbers that are shaded three times: 12.

c. Extend the chart to 50 and follow the same procedure as above. Discuss the patterns that emerge on the chart when shading for 3s and 4s.

UNIT 12 LESSON 5

Objective A50

Multiply by 3 with products to 18.

Vocabulary

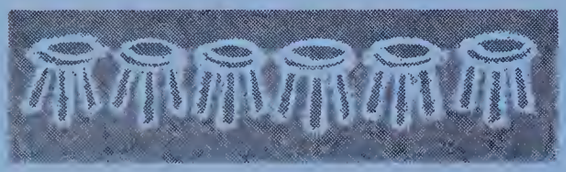
Multiply by 3
Direction words: How many wheels?

Materials

Chalkboard sketches

Introducing the Lesson

Draw 6 three-legged stools on the chalkboard.



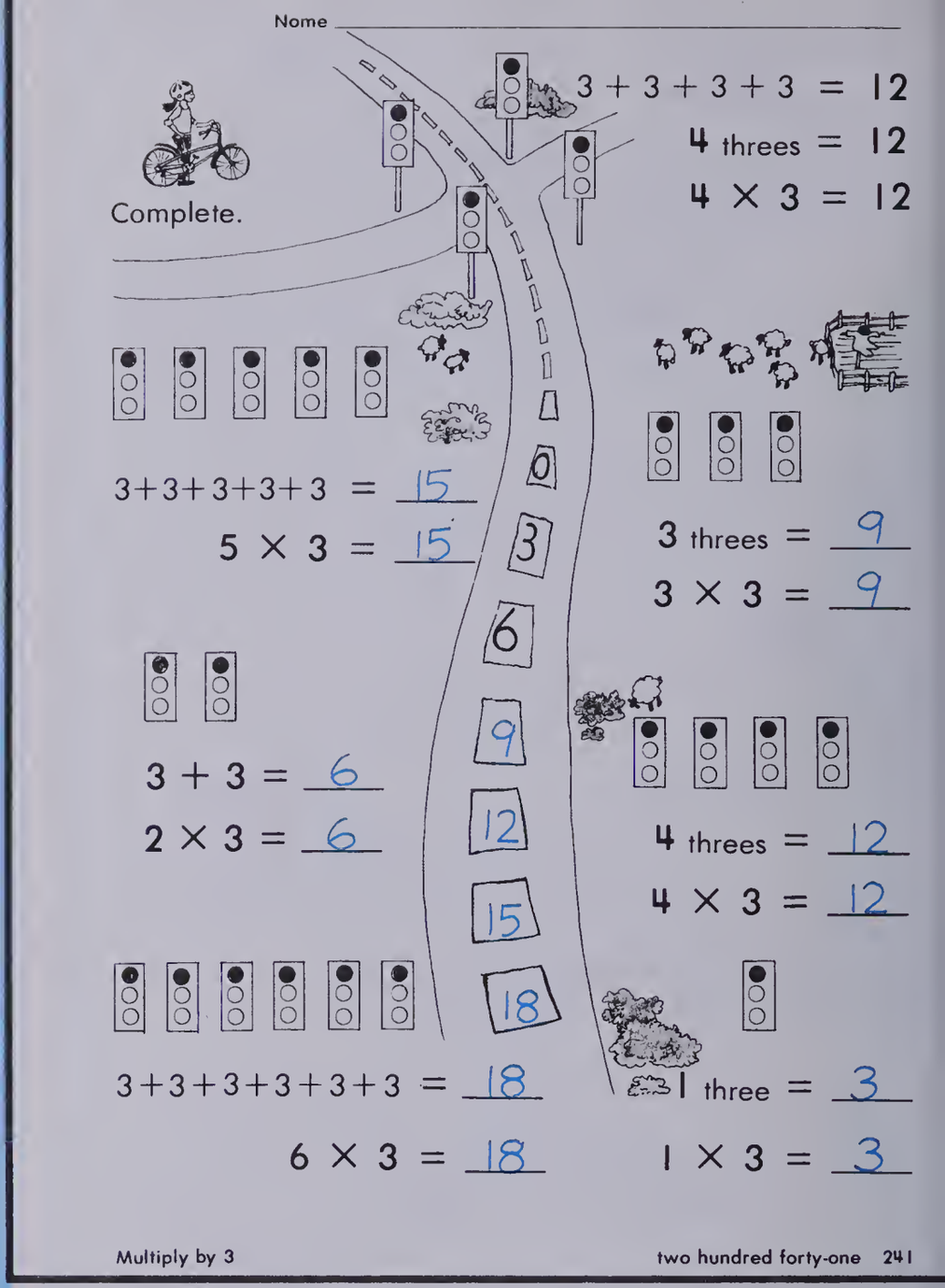
Orally count by threes to find how many legs in all. If students have difficulty remembering the counting sequence, whisper count: *one, two, THREE, four, five, SIX, . . . EIGHTEEN* while touching the legs.

Teaching the Lesson

Circle 2 stools. Explain that this is 2 groups of 3 legs or 2 threes. To find how many legs in all, we can:
a. count by threes: 3, 6
b. add threes: 3 + 3 = 6
c. multiply by 3: 2 × 3 = 6

Write **b.** and **c.** on the board. Read each sentence.

Repeat this same procedure for 3 stools, 4 stools, 5 stools, 6 stools, etc.



Using the Pages

- For the top of page 241, have the students orally read the three number sentences given. Encourage them to use the pictures of the stoplights to help complete the remaining sentences. Don't forget to have the students complete the counting sequence in the middle of the road.
- The left side of page 242 reviews the 3 times table using tricycles as the model. The right side of the page reviews the 2, 3, and 5 times tables.

How many wheels?



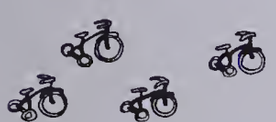
1 × 3 = 3



2 × 3 = 6



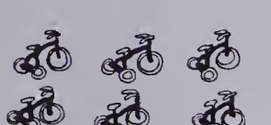
3 × 3 = 9



4 × 3 = 12



5 × 3 = 15



6 × 3 = 18

Multiply.

2 × 2 = 4
6 × 2 = 12
3 × 2 = 6
8 × 2 = 16
4 × 2 = 8

2 × 3 = 6
4 × 3 = 12
1 × 3 = 3
6 × 3 = 18
5 × 3 = 15

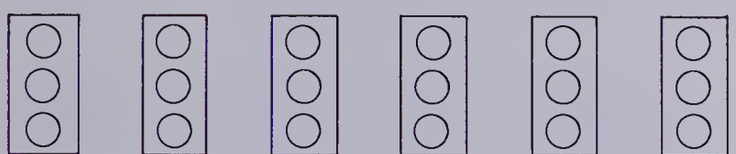
2 × 5 = 10
4 × 5 = 20
3 × 5 = 15
1 × 5 = 5
5 × 2 = 10

3 × 3 = 9
2 × 2 = 4
7 × 2 = 14
4 × 3 = 12
8 × 2 = 16

Extra Practice

Worksheet A50
Pages 241-242

Count.



3 6 9 12 15 18

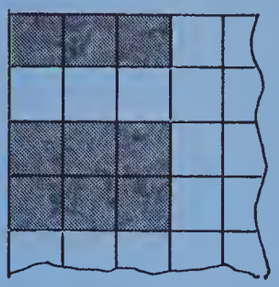
Multiply.

2 × 3 = 6 5 × 3 = 15 4 × 3 = 12

6 × 3 = 18 1 × 3 = 3 3 × 3 = 9

Reinforcement

Have the students use graph paper to shade in rows of 3 squares, as shown, for up to 6 rows of 3.



1 row of 3

2 rows of 3

Try these activities with the shaded squares.

a. Count the squares to find how many squares are shaded for each picture.

b. Prepare flash cards for the 3 times tables. Match the flash card with the correctly shaded picture.

1 × 3	2 × 3	3 × 3
4 × 3	5 × 3	6 × 3

c. Ask the students to use triangles to model each flash card from **b.** to find how many sides (or corners) in all.



This matches with 4 × 3 or 12 sides in all.

Enrichment

Have the students complete the following chart on "Roads and Intersections".

Picture	Number of Roads Going		Number of Intersections
	Across	Up and Down	
	3	1	3
	3	2	6

Extend the chart to 27 intersections.

UNIT 12 LESSON 6

Objective A51

Multiply by 4 with products to 20.

Vocabulary

Multiply by 4
Direction words: How many legs?

Materials

Chalkboard sketches

Introducing the Lesson

Draw 5 diamonds on the chalkboard.



To find how many corners (or sides) in all, count by fours. If students have difficulty remembering the counting sequence, whisper count, *one, two, three, FOUR,... TWENTY* while touching the corners.

Teaching the Lesson

Circle 3 diamonds. Explain that this is 3 groups of 4 corners or 3 fours. To find how many corners in all we can:

a. count by fours: 4, 8, 12
b. add fours: 4 + 4 + 4 = 12
c. multiply by 4: 3 × 4 = 12

Repeat for 4 and 5 diamonds.

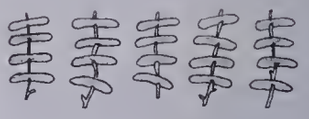
Name _____

$4 + 4 + 4 = 12$
3 fours = 12
$3 \times 4 = 12$
3 times 4 equals 12.



Complete.





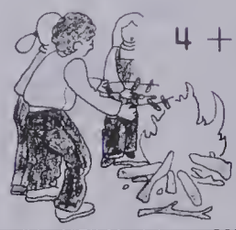
$4 + 4 = 8$
2 fours = 8
$2 \times 4 = 8$

$4 + 4 + 4 + 4 + 4 = 20$
5 fours = 20
$5 \times 4 = 20$





$4+4+4 = 12$
3 fours = 12
$3 \times 4 = 12$



$4 + 4 + 4 + 4 = 16$
4 fours = 16
$4 \times 4 = 16$

1 four = 4	4 fours = 16	5 fours = 20
$1 \times 4 = 4$	$4 \times 4 = 16$	$5 \times 4 = 20$

Using the Pages

- For the top of page 243, have the students orally read the four number sentences given. Have them complete the remainder of the page using the camping pictures provided. Note that the bottom three questions do not have pictures.
- The left side of page 244 provides a review of multiplying by 4 using animal legs as the picture model. The remaining sets of questions review the 2, 3, 4, and 5 times tables.

How many legs?

Multiply.

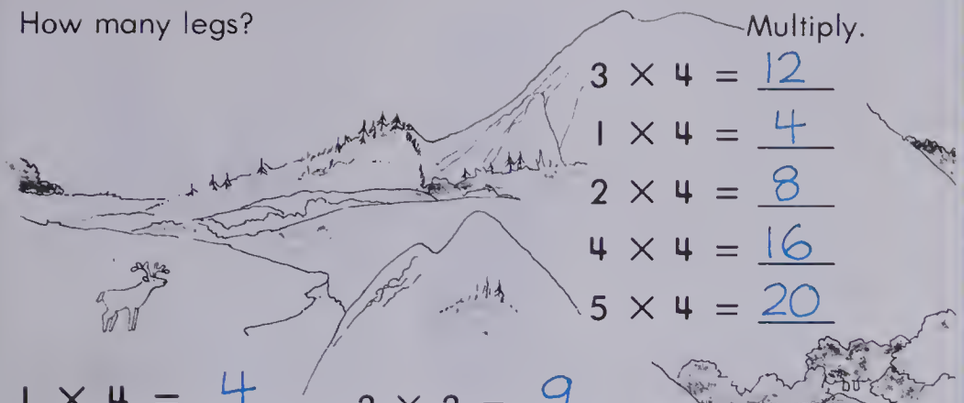
3 × 4 = 12

1 × 4 = 4

2 × 4 = 8

4 × 4 = 16

5 × 4 = 20



1 × 4 = 4



2 × 4 = 8



3 × 4 = 12



4 × 4 = 16



5 × 4 = 20

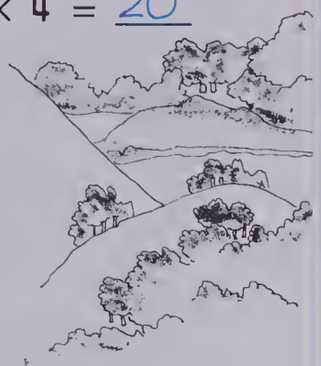
3 × 3 = 9

5 × 3 = 15

2 × 3 = 6

6 × 3 = 18

4 × 3 = 12



3 × 5 = 15

4 × 5 = 20

2 × 5 = 10

1 × 5 = 5

1 × 2 = 2



6 × 2 = 12

4 × 2 = 8

7 × 2 = 14

3 × 2 = 6

9 × 2 = 18

Extra Practice

Worksheet A51

Pages 243-244

Count.



4 8 12 16

Multiply.

3 × 4 = 12

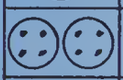
1 × 4 = 4

4 × 4 = 16

2 × 4 = 8

Reinforcement

1. Prepare a chart like the following with the class.

Groups	Meaning	Multiplication	How many?
	1 four	1 × 4	4
	2 fours	2 × 4	8

2. Prepare flash cards for the 4 times table to 20.

1 × 4 | 2 × 4 | 3 × 4 | 4 × 4 | 5 × 4

Have the students use rectangles to model each flash card to find how many sides (corners) in all.



This matches 2 × 4 or 8 sides in all.

Enrichment

Extend the 4 times table to 36. Have students use blocks or draw pictures to illustrate each new fact and to find how many in all.

UNIT 12 LESSON 7

Objective A52

Multiply by 1; review facts with products to 20.

Vocabulary

Multiply by 1
Direction words: How many bees?

Materials

Multiplication flash cards (for the facts studied so far)

Introducing the Lesson

Show the following flash cards.

2 × 3 | 4 × 5 | 7 × 2 | 4 × 4

Review how to read them, e.g., "Two times three equals . . .".

Draw stars (or use magnetic counters) on the board to illustrate each question. Have the students match the picture with the appropriate fact card and then find how many in all.

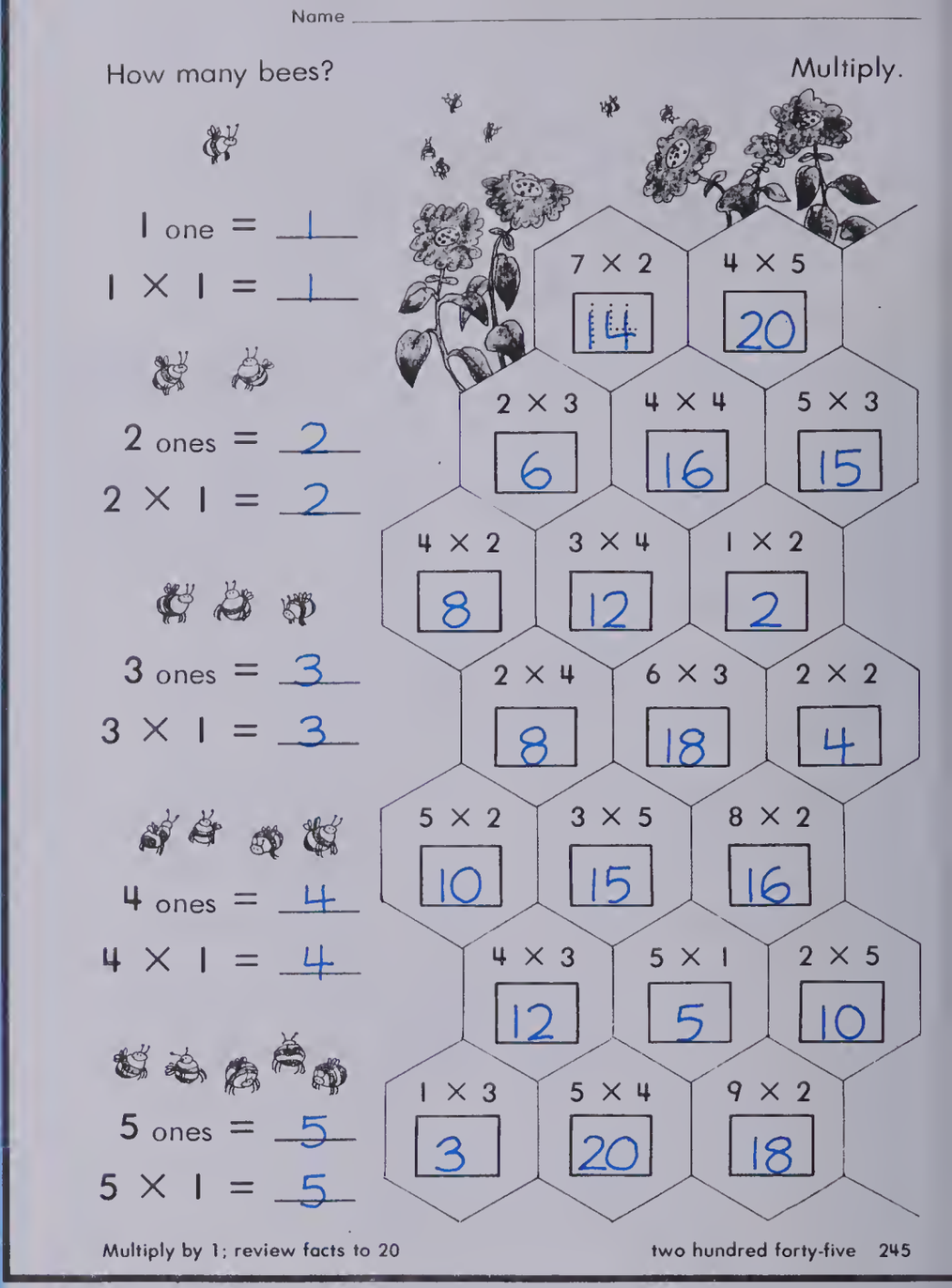


Teaching the Lesson

Draw 5 stars and circle each one as shown.



Explain that these are 5 groups with 1 star in each group. To find how many stars in all, we can multiply 5 × 1 = 5.
Erase 1 star. Now there are 4 groups with 1 star in each. Ask for the multiplication sentence to find how many stars in all (4 × 1 = 4).
Erase 1 more star and repeat (3 × 1 = 3).
Erase 1 more star and repeat (2 × 1 = 2).
Erase 1 more star and repeat (1 × 1 = 1).



Using the Pages

- The left side of page 245 reviews the 1 times table. Have students circle each bee to form groups with 1 bee in each group. The honeycombs on the right side provide a review of the times tables studied so far. Provide counters if the students are having difficulty finding the answers.
- Discuss the picture at the top of page 246 and solve the cookies and apples problems together before assigning the rest of this problem-solving page.



COOKIES

1  costs 2 ¢

2  cost 4 ¢

8  cost 16 ¢

APPLES

1  costs 5 ¢

2  cost 10 ¢

4  cost 20 ¢

LEMONADE

1  costs 4 ¢

2  cost 8 ¢

3  cost 12 ¢

CAKE

1  costs 3 ¢

3  cost 9 ¢

6  cost 18 ¢

CHERRIES

1  costs 1 ¢

5  cost 5 ¢

10  cost 10 ¢

LEMONADE

3  cost 12 ¢

4  cost 16 ¢

5  cost 20 ¢

Extra Practice **Worksheet A52**
Pages 245-246

Multiply.

1 × 3 = 3	4 × 1 = 4	9 × 1 = 9
2 × 3 = 6	4 × 2 = 8	9 × 2 = 18
3 × 3 = 9	5 × 1 = 5	5 × 2 = 10
4 × 3 = 12	6 × 2 = 12	4 × 5 = 20
5 × 3 = 15	7 × 2 = 14	2 × 5 = 10
6 × 3 = 18	3 × 2 = 6	3 × 4 = 12

Reinforcement

1. Play "Mix-up Multiplication". Materials: 3 cubes, one labelled 1, 2, 2, 3, 4, 4; another labelled 1, 2, 3, 3, 4, 5; and the last labelled x, x, x, x, x, x. Each player in turn rolls the cubes, reads the multiplication sentence, and finds the total by using counters. The winner of each round is the player with the highest total.

Variation: Play several rounds. For each round the players add their totals. The player with the highest cumulative score is the winner.

2. Have the students practise with flash cards for products to 20. Allow them to use counters if necessary.

Enrichment

1. Challenge the students with these multiplication cross-number puzzles. Although some of the factors will end in products larger than they have practised, e.g., 8 × 3, encourage the children to figure them out by thinking of what it means and by using counters.

X		
2	4	
3	1	

X		
2	5	
3	1	

X		
3	2	
3	1	

2. Ask the children to add their own items to the sale on page 246 and then prepare three questions for another student to answer.

Problem Solving Activities

Assign Level 2, Unit 12

UNIT 12 LESSON 8

Objective A53

Prepare for division.

Vocabulary

How many groups of?
Direction words: Circle the groups.

Materials

20 interlocking cubes per student

Introducing the Lesson

Have each student count out 20 cubes. A variety of colours can be used. Demonstrate how to build 2 groups of 5 using interlocking cubes.



Ask the students to build the following.
a. 3 groups of 4 **b.** 4 groups of 2
c. 6 groups of 3

Teaching the Lesson

Ask students to count out 12 cubes from their 20 and find out how many groups of 4 they can make. On the board write, "There are 3 groups of 4 in 12." All students should have built the following.



Ask students to count out 8 cubes and find how many groups of 2 they can make. Write, "There are 4 groups of 2 in 8."

Ask students to count out 15 cubes and find how many groups of 5 they can make. Write, "There are 3 groups of 5 in 15". Then ask how many fives are in 10? *Two.* To check, take 1 group of 5 away. Write, "There are 2 groups of 5 in 10." Then ask how many fives are in 5? *One.* To check, take another group of 5 away. Write, "There is 1 group of 5 in 5."

Have the students count out 18 cubes and make groups of 3. Ask, "How many groups of 3 in 18? in 15? in 12? in 9? in 6? in 3?" Have the students find out by taking groups of 3 away. They should not take the cubes apart each time and recount.

All students should be able to do the above activities without difficulty before assigning the workbook pages.

Name _____

20 corn plants

How many groups of **four** in 20?



There are 5 fours in 20.

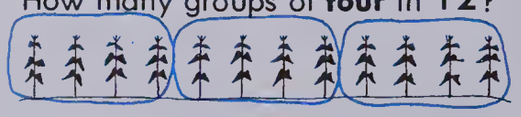
Circle the groups.

How many groups of **three** in 15?



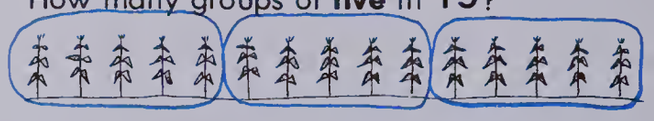
5 threes

How many groups of **four** in 12?



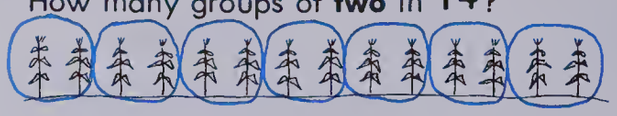
3 fours

How many groups of **five** in 15?



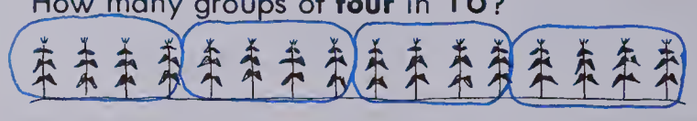
3 fives

How many groups of **two** in 14?



7 twos

How many groups of **four** in 16?



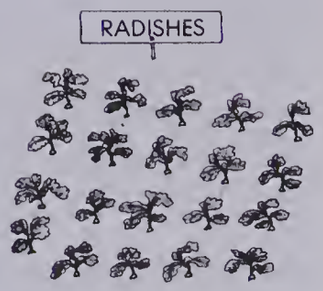
4 fours

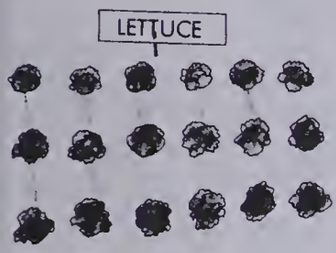
Using the Pages

- Read and discuss the example at the top of page 247. Make sure all students circle the number of groups required before completing the boxes.
- For page 248, have the students circle the number of groups asked for in each picture before answering the questions. The circling will make the groups more visible.

Find how many.

How many groups of four in 4? 1
How many groups of four in 8? 2
How many groups of four in 12? 3
How many groups of four in 16? 4
How many groups of four in 20? 5





How many groups of three in 6? 2
How many groups of three in 9? 3
How many groups of three in 12? 4
How many groups of three in 15? 5
How many groups of three in 18? 6

How many groups of two in 2? 1
How many groups of two in 4? 2
How many groups of two in 6? 3
How many groups of two in 10? 5
How many groups of two in 12? 6
How many groups of two in 18? 9



Extra Practice

Worksheet A53
Pages 247-248

Complete.



4 groups of 3



3 groups of 4



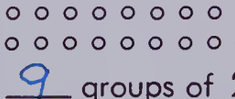
6 groups of 3



4 groups of 5



6 groups of 2

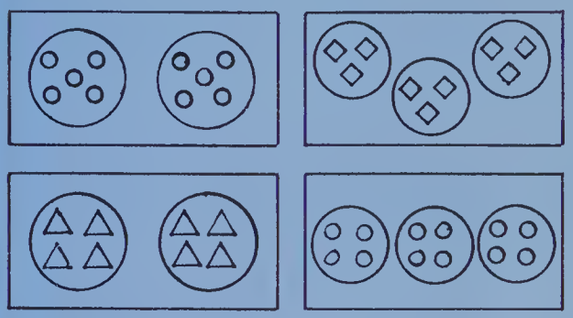


9 groups of 2

Reinforcement

1. Have the students use cubes from the lesson to answer the following.
a. How many 2s in 2? 4? 8? 12? 16? 18?
b. How many 3s in 3? 6? 9? 12? 15? 18?
c. How many 4s in 4? 8? 12? 16? 20?
d. How many 5s in 5? 10? 15? 20?

2. Prepare a worksheet like the following for students to match the picture with the appropriate description.



3 groups of 4 in 12.	2 groups of 5 in 10.
3 groups of 3 in 9.	2 groups of 4 in 8.

3. Pass out the picture cards prepared for the Reinforcement Activities in Lessons 2 and 3. Have the students tell what each one shows using a sentence model.

☐ groups of ☐ in ☐

Enrichment

List the activities and trips that the students are planning for their summer holidays. Categorize and graph them to find out the most popular activity.

UNIT 12 LESSON 9

Objective A54

Divide using the division symbol.

Vocabulary

Divided by, division, divide
Direction words: Circle the groups and complete each division. Divide.

Materials

Interlocking cubes

Introducing the Lesson

Review Lesson 8 by having each student count out 20 cubes and find the number of groups of 5 in 20. *4 groups of 5.* Then ask, "How many 5s in 15? in 10? in 5?" The students should be able to answer without taking the cubes apart each time and recounting.

Teaching the Lesson

Explain that there is a special way to write how many groups of 5 in 20. Write the following on the board, $20 \div 5 = 4$, and explain what each number means.

20	÷	5	=	4
↓		↓		↓
cubes in all		number in each group		number of groups

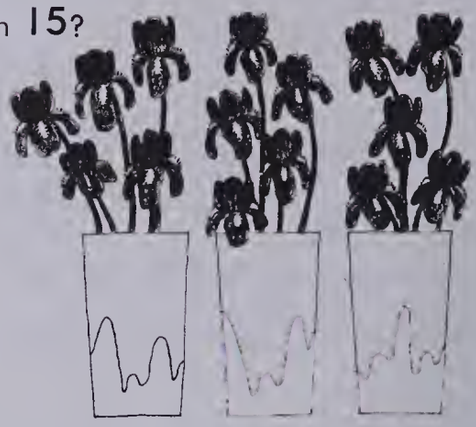
Explain that this is called a division sentence. We read it as, "Twenty divided by five equals four". It means that there are 4 fives in twenty. Emphasize the new symbol by demonstrating how to write it and how to read it.

Ask students to use cubes to find how many twos are in 12. Explain that the division sentence for this is $12 \div 2 = 6$. Read it aloud and review what each number means.

Repeat with other examples until the students are comfortable with the new sentence, symbol, and vocabulary.

Name _____

How many groups of **five** in 15?



flowers in all		in each group		groups
15	÷	5	=	3

15 divided by 5 equals 3.

There are 3 fives in 15.

Circle the groups and complete each division.

1. How many **twos** in 12?



12 ÷ 2 = 6

2. How many **threes** in 12?



12 ÷ 3 = 4

3. How many **fours** in 12?



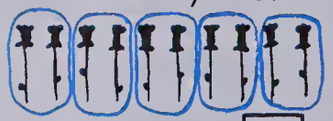
12 ÷ 4 = 3

4. How many **fives** in 10?



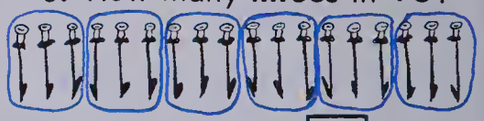
10 ÷ 5 = 2

5. How many **twos** in 10?



10 ÷ 2 = 5

6. How many **threes** in 18?



18 ÷ 3 = 6

Division two hundred forty-nine 249

Using the Pages

- Read and discuss the example at the top of page 249. On the remainder of the page, the students are to circle the groups and complete each division. Review how to read each sentence and tell what each one means.
- Page 250 provides pictures of flowers already in groups to help students solve the division sentences. If students have difficulty, do this page together.

Divide.

$6 \div 3 = \boxed{2}$

$9 \div 3 = \boxed{3}$

$12 \div 3 = \boxed{4}$



$6 \div 2 = \boxed{3}$

$8 \div 2 = \boxed{4}$

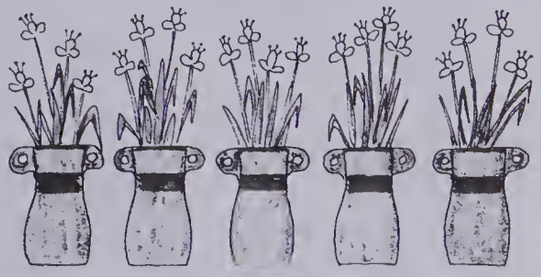
$10 \div 2 = \boxed{5}$



$8 \div 4 = \boxed{2}$

$12 \div 4 = \boxed{3}$

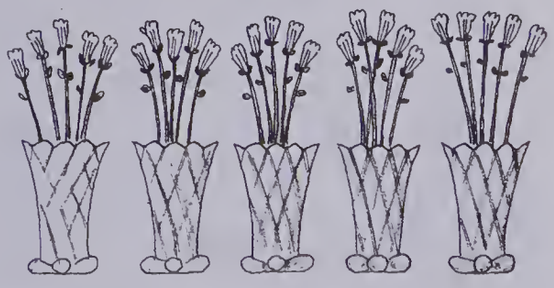
$16 \div 4 = \boxed{4}$



$10 \div 5 = \boxed{2}$

$15 \div 5 = \boxed{3}$

$20 \div 5 = \boxed{4}$



Reinforcement

1. Ask the students to fill in the blanks to tell what each means.

a. $8 \div 2$ How many $\boxed{\text{twos}}$ in $\boxed{8}$?

b. $9 \div 3$ How many $\boxed{}$ in $\boxed{}$?

c. $16 \div 4$ How many $\boxed{}$ in $\boxed{}$?

d. $10 \div 5$ How many $\boxed{}$ in $\boxed{}$?

2. Prepare division cards for the picture cards prepared for the Reinforcement Activities in Lessons 2 and 3.

$\boxed{8 \div 2}$ $\boxed{6 \div 3}$ $\boxed{12 \div 4}$

Shuffle the division cards and place them face down. Lay the picture cards face up in random order. Each player, in turn, takes a division card and finds its matching picture card. In order to keep the pair, the player must answer the division card.

Enrichment

Each picture can be used to answer a division and a multiplication question. Have students complete the following chart.

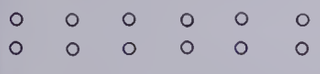
Multiply	Picture	Divide
$3 \times 5 = 15$		$15 \div 5 = 3$
		
		
		

Extra Practice **Worksheet A54**
Pages 249-250

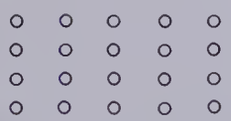
Divide.



$9 \div 3 = \underline{3}$ $15 \div 3 = \underline{5}$



$4 \div 2 = \underline{2}$ $12 \div 2 = \underline{6}$



$12 \div 4 = \underline{3}$ $20 \div 4 = \underline{5}$



$15 \div 5 = \underline{3}$ $20 \div 5 = \underline{4}$

UNIT 12 LESSON 10

Objective A55

Divide with dividends to 20.

Vocabulary

Divide

Materials

20 interlocking cubes per student

Introducing the Lesson

Have each student count out 20 cubes and make groups of 2.

Teaching the Lesson

Write 12 ÷ 2 on the board. Review how to read this, "Twelve divided by two" and what it means, "How many groups of 2 in 12?" Ask the students to count their groups of 2 to find the answer. *Six.* Repeat with 18 ÷ 2, 6 ÷ 2, and 14 ÷ 2. Make sure students know how many cubes to start with before counting the groups of 2.

Have students make groups of 4 with their cubes. Write 16 ÷ 4 on the board. Review how to read it and tell what it means. Encourage the students to use their cubes to find the answer. *Four.* Repeat with 12 ÷ 4, 20 ÷ 4, and 4 ÷ 4. Make sure the students know how many cubes to start with before counting the groups of 4.

Reinforcement

Write the following sets of numbers on the chalkboard or on a worksheet. Ask the students to write a related multiplication and division fact for each.

2, 7, 14: $2 \times 7 = 14$
$14 \div 7 = 2$

a. 3, 2, 6
b. 4, 1, 4
c. 5, 3, 15
d. 2, 4, 8
e. 3, 6, 18
f. 5, 4, 20
g. 4, 3, 12
h. 2, 9, 18

UNIT 12 TEST

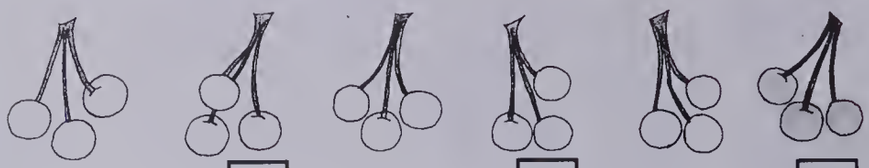
Part 1: Count by 2s, 3s, 4s, and 5s.

Part 2: Multiply by 2, 3, 4, and 5 with products to 20.

Part 3: Divide by 2, 3, 4, and 5 with dividends to 20.

Name _____

Divide.



6 ÷ 3 = 2 18 ÷ 3 = 6 12 ÷ 3 = 4
9 ÷ 3 = 3 15 ÷ 3 = 5 3 ÷ 3 = 1



4 ÷ 2 = 2 8 ÷ 2 = 4 14 ÷ 2 = 7
6 ÷ 2 = 3 12 ÷ 2 = 6 16 ÷ 2 = 8



4 ÷ 4 = 1 12 ÷ 4 = 3 20 ÷ 4 = 5
8 ÷ 4 = 2 16 ÷ 4 = 4 12 ÷ 4 = 3



10 ÷ 5 = 2 5 ÷ 5 = 1
20 ÷ 5 = 4 15 ÷ 5 = 3

Division two hundred fifty-one 251

Using the Page

- Assign page 251 as an independent activity only to those students that are able to read and interpret the division sentences themselves. With the rest of the students, do this page as a group.

Name _____

Count.

2	4	6	8	10
1	3	5	7	9
4	8	12	16	20

3	6	9	12	15
10	12	14	16	18
5	10	15	20	25

Multiply.



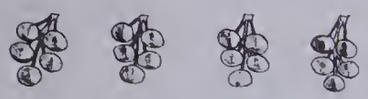
2 × 3 = 6

4 × 3 = 12



2 × 4 = 8

3 × 4 = 12



3 × 5 = 15

4 × 5 = 20



5 × 2 = 10

7 × 2 = 14

Divide.



How many fives in 15? 3

How many threes in 15? 5



12 ÷ 4 = 3



10 ÷ 2 = 5

Extra Practice **Worksheet A55**
Pages 251-252

Divide.

12 ÷ 3 = 4	18 ÷ 3 = 6	6 ÷ 3 = 2
10 ÷ 2 = 5	6 ÷ 2 = 3	8 ÷ 2 = 4
16 ÷ 4 = 4	8 ÷ 4 = 2	12 ÷ 4 = 3
10 ÷ 5 = 2	20 ÷ 5 = 4	15 ÷ 5 = 3
16 ÷ 2 = 8	15 ÷ 3 = 5	20 ÷ 4 = 5
9 ÷ 3 = 3	12 ÷ 2 = 6	4 ÷ 2 = 2

Informal Assessment

For students who seem to have difficulty with the written test, the following individual assessment items may provide more specific information.

Counting Skills

1. From memory

Can the student skip count by 5s to 50, 2s to 20, 3s to 18, and 4s to 20? Make a note of those known from memory.

2. Using blocks, fingers, or pictures

If the student cannot count from memory, can he or she use materials, pictures, or fingers to skip count by 5s, 2s, 3s, and 4s? If not, more work with concrete materials and whisper counting as explained in Lessons 3 and 4 should be provided.

Multiplication Skills

1. Concept and vocabulary

a. Can the student translate a picture into a multiplication sentence?

b. Given 4 × 3, can the student tell what it means (4 groups of 3) and find how many in all (12)?

c. Does the student use correct vocabulary in reading a multiplication sentence like 7 × 2 = 4?

(If students have difficulty with these tasks, provide more experience in building "groups of" and relating these groups to multiplication. See the Teaching sections for Lessons 2, 3, 5, and 6.)

2. Observe the student as he or she completes an exercise such as that on page 244 or 245. To find the product, do they:

a. know it without thinking (recall)?

b. count in their heads?

c. draw pictures or tallies?

d. use concrete materials, e.g., blocks, fingers, etc.?

e. other?

Division Skills

Concept and vocabulary

a. Can the student separate 14 counters into groups of 2 and tell how many groups in all? Can the student then write a division sentence for this?

b. Given 12 ÷ 3 can the student tell what it means (how many threes in 12?) and find the answer (4)?

c. Does the student use correct vocabulary in reading a division sentence like 6 ÷ 3 = 2?

Name _____

Print the missing numerals.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

Which is greater?

7 (9) (3) 5 (19) 12

Which is less?

6 (2) 12 (9) (14) 18

Print how many.



1 ten 3 ones = 13



1 ten 6 ones = 16



1 ten 9 ones = 19



1 ten 7 ones = 17



1 (1¢) 3 (10¢) = 13¢



2 (10¢) 0 (1¢) = 20¢

Add.

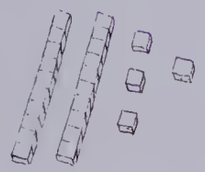
1 + 1 = 2	1 + 3 = 4	2 + 1 = 3	4 + 2 = 6	2 + 3 = 5	3 + 0 = 3
6 + 1 = 7	5 + 2 = 7	1 + 8 = 9	0 + 5 = 5	2 + 2 = 4	4 + 3 = 7
3 + 5 = 8	5 + 4 = 9	3 + 3 = 6	1 + 4 = 5	6 + 2 = 8	3 + 2 = 5
2 + 7 = 9	6 + 1 = 7	4 + 4 = 8	2 + 5 = 7	7 + 1 = 8	3 + 4 = 7

Subtract.

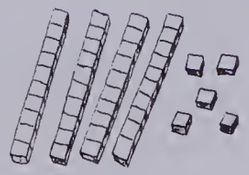
4 − 2 = 2	3 − 1 = 2	5 − 2 = 3	6 − 4 = 2	5 − 1 = 4	8 − 0 = 8
2 − 2 = 0	4 − 3 = 1	6 − 2 = 4	7 − 5 = 2	8 − 3 = 5	9 − 7 = 2
6 − 3 = 3	8 − 6 = 2	9 − 2 = 7	7 − 3 = 4	9 − 5 = 4	8 − 4 = 4
5 − 4 = 1	9 − 3 = 6	4 − 1 = 3	8 − 5 = 3	7 − 4 = 3	9 − 8 = 1

Name _____

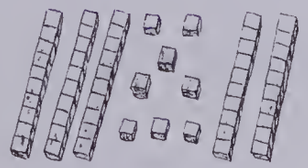
Print how many.



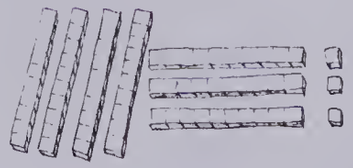
2 tens 4 ones = 24



4 tens 5 ones = 45



5 tens 8 ones = 58



7 tens 3 ones = 73

Print the missing numerals.

25	26	27
32	33	34
66	67	68
49	50	51
28	29	30
69	70	71

Which is greater?

(68) 62 70 (79) (84) 22 39 (63)

Which is less?

(43) 47 59 (55) (28) 82 ()

Add.

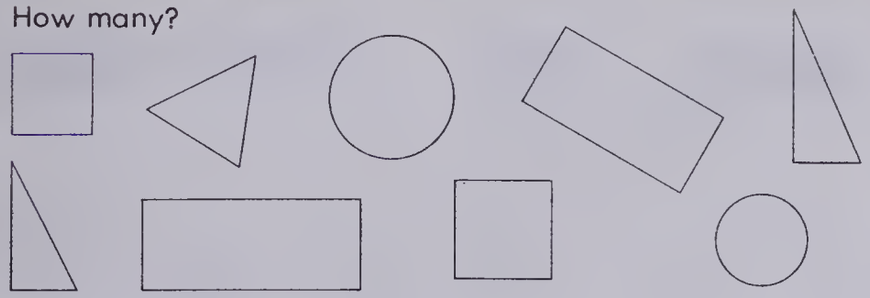
9 + 1 = 10	6 + 5 = 11	8 + 2 = 10	9 + 3 = 12	3 + 7 = 10	2 + 9 = 11
7 + 4 = 11	4 + 8 = 12	7 + 5 = 12	8 + 3 = 11	6 + 6 = 12	6 + 4 = 10
2 + 8 = 10	3 + 9 = 12	3 + 8 = 11	5 + 5 = 10	5 + 7 = 12	4 + 7 = 11
5 + 6 = 11	9 + 2 = 11	7 + 3 = 10	8 + 4 = 12	4 + 6 = 10	1 + 9 = 10

Subtract.

10 − 2 = 8	11 − 6 = 5	12 − 3 = 9	10 − 1 = 9	10 − 7 = 3	11 − 8 = 3
11 − 4 = 7	10 − 8 = 2	12 − 8 = 4	11 − 5 = 6	11 − 3 = 8	12 − 7 = 5
10 − 9 = 1	12 − 4 = 8	12 − 6 = 6	10 − 6 = 4	11 − 9 = 2	10 − 4 = 6
12 − 9 = 3	10 − 3 = 7	11 − 7 = 4	12 − 5 = 7	10 − 5 = 5	11 − 2 = 9

Name _____

How many?

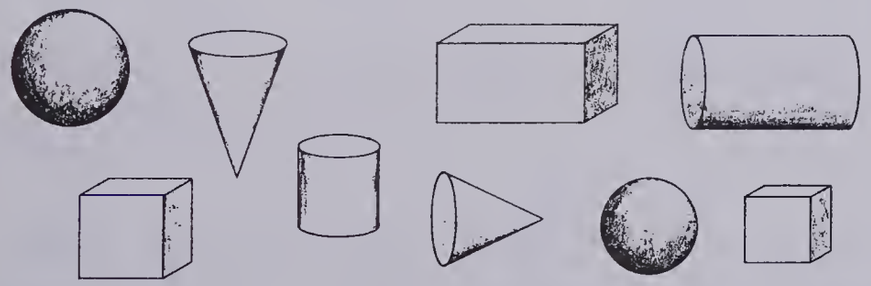


2 circles

2 squares

3 triangles

2 rectangles



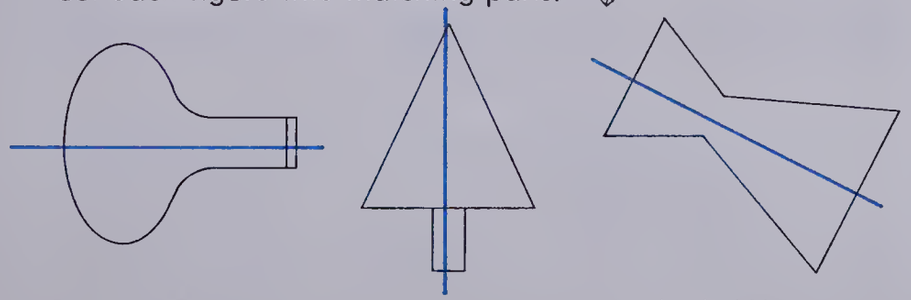
2 cones

2 balls

3 boxes

2 cans

Cut each figure into matching parts.



Write how many.



3 hundreds 4 tens 5 ones = 345



2 hundreds 7 tens 0 ones = 270



5 hundreds 0 tens 6 ones = 506

Which is greater?

287 **293**	654 **781**	**256** 252

Which is less?

305 351	982 **629**	**445** 448

Count.

226	227	228	229	230	231	232
197	198	199	200	201	202	203
325	330	335	340	345	350	355

How much money?



$1.34

Name _____

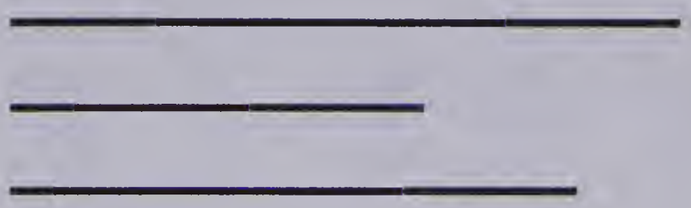
Add.

62 + 4 = 66	81 + 7 = 88	56 + 3 = 59	9 + 80 = 89	3 + 24 = 27	50 + 10 = 60
30 + 20 = 50	32 + 21 = 53	31 + 55 = 86	63 + 22 = 85	25 + 42 = 67	32 + 64 = 96
87 + 12 = 99	14 + 73 = 87	54 + 12 = 66	61 + 24 = 85	18 + 11 = 29	12 + 32 = 44
800 + 100 = 900	210 + 320 = 530	261 + 14 = 275	209 + 310 = 519	615 + 104 = 719	234 + 432 = 666

Subtract.

66 − 4 = 62	38 − 2 = 36	75 − 1 = 74	89 − 9 = 80	30 − 20 = 10	60 − 30 = 30
45 − 14 = 31	28 − 10 = 18	75 − 61 = 14	87 − 53 = 34	59 − 28 = 31	37 − 13 = 24
28 − 14 = 14	38 − 25 = 13	49 − 43 = 6	88 − 38 = 50	63 − 42 = 21	88 − 35 = 53
400 − 200 = 200	890 − 450 = 440	927 − 300 = 627	288 − 25 = 263	681 − 240 = 441	937 − 322 = 615

Measure each line.



13 cm

8 cm

11 cm

Which is longer? 4 centimetres or 4 metres

Which is shorter? 50 centimetres or 1 metre

Which is hotter?

5°C 12°C

0°C 10°C

30°C 13°C

What time is it?



6:00



11:00



8:30



12:30



3:15



10:45

Name _____

Add.

9 + 8 = 17	5 + 9 = 14	8 + 8 = 16	6 + 7 = 13	7 + 9 = 16	9 + 6 = 15
8 + 6 = 14	9 + 9 = 18	5 + 8 = 13	4 + 9 = 13	7 + 7 = 14	7 + 8 = 15

Subtract.

13 − 4 = 9	14 − 6 = 8	13 − 8 = 5	17 − 8 = 9	14 − 7 = 7	16 − 8 = 8
14 − 9 = 5	18 − 9 = 9	15 − 8 = 7	13 − 6 = 7	15 − 7 = 8	16 − 9 = 7
15 − 6 = 9	14 − 8 = 6	17 − 9 = 8	13 − 5 = 8	16 − 7 = 9	15 − 9 = 6

Add or subtract.

8 + 7 = 15	9 + 4 = 13	13 − 4 = 9	16 − 8 = 8	8 + 5 = 13	14 − 5 = 9
6 + 8 = 14	13 − 7 = 6	9 + 9 = 18	6 + 9 = 15	13 − 9 = 4	9 + 7 = 16

Add.

14 + 7 = 21	26 + 8 = 34	45 + 4 = 49	3 + 19 = 22	5 + 28 = 33	6 + 54 = 60
39 + 23 = 62	48 + 37 = 85	58 + 29 = 87	28 + 41 = 69	39 + 26 = 65	66 + 15 = 81
77 + 13 = 90	14 + 59 = 73	29 + 19 = 48	31 + 49 = 80	81 + 12 = 93	62 + 29 = 91

Subtract.

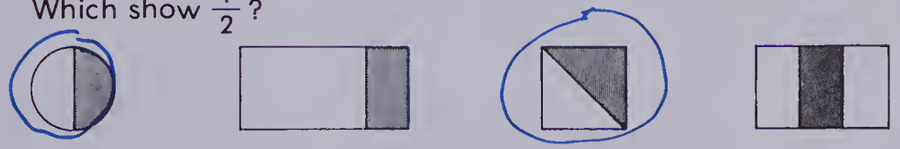
23 − 6 = 17	35 − 8 = 27	51 − 3 = 48	74 − 7 = 67	85 − 4 = 81	41 − 5 = 36
36 − 14 = 22	40 − 37 = 3	93 − 48 = 45	43 − 25 = 18	63 − 17 = 46	52 − 49 = 3
97 − 48 = 49	54 − 27 = 27	42 − 18 = 24	70 − 22 = 48	98 − 28 = 70	62 − 33 = 29

Add or subtract.

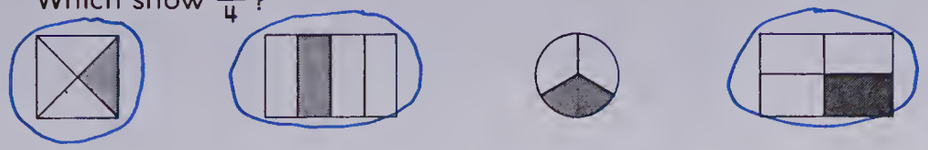
33 + 37 = 70	45 − 26 = 19	54 − 5 = 49	2 + 88 = 90	30 − 18 = 12	27 + 48 = 75

Name _____

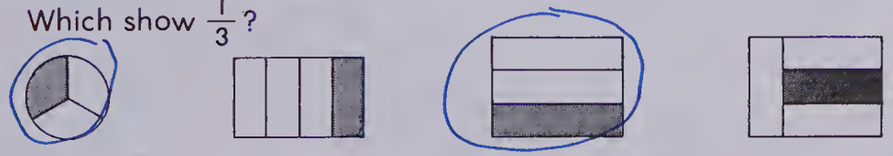
Which show $\frac{1}{2}$?



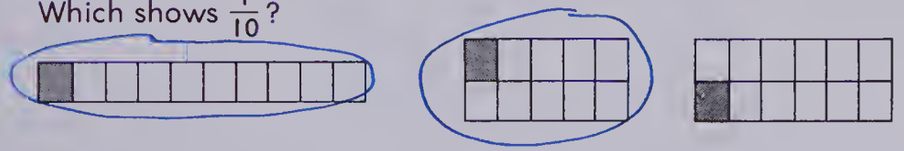
Which show $\frac{1}{4}$?



Which show $\frac{1}{3}$?

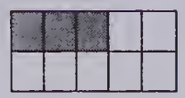


Which shows $\frac{1}{10}$?



Print the decimal.

 0.1

 0.3

5 tenths = 0.5

9 tenths = 0.9

$\frac{7}{10}$ = 0.7

$\frac{4}{10}$ = 0.4

$\frac{8}{10}$ = 0.8

Which unit?



kilogram or **litre**

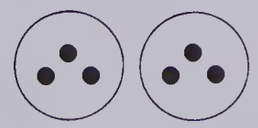


kilogram or **litre**

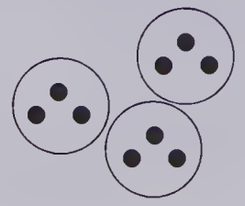
Multiply.

2 × 2 = 4	5 × 2 = 10	7 × 2 = 14
6 × 2 = 12	4 × 2 = 8	9 × 2 = 18
3 × 2 = 6	2 × 3 = 6	5 × 3 = 15
4 × 3 = 12	3 × 4 = 12	4 × 4 = 16
1 × 4 = 4	4 × 1 = 4	5 × 1 = 5
4 × 5 = 20	5 × 4 = 20	3 × 5 = 15
2 × 5 = 10	8 × 2 = 16	3 × 6 = 18

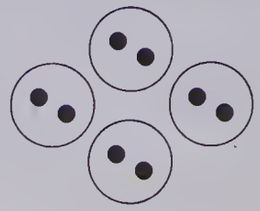
Divide.



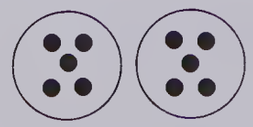
6 ÷ 3 = 2



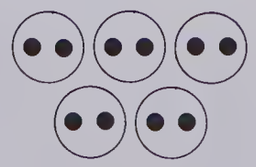
9 ÷ 3 = 3



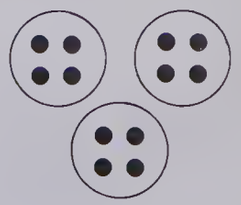
8 ÷ 2 = 4



10 ÷ 5 = 2



10 ÷ 2 = 5



12 ÷ 4 = 3

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